IEG CONSULTANTS LTD.

Shell Canada Energy

Camp Farewell

Camp Farewell Remediation Program, Annual Report 2018

April 2019
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Inuvialuit Water Board
P.O. Box 2531
Inuvik NT
X0E 0T0

Mr. Bijaya Adhikari
Science and Regulatory Coordinator

Dear Mr. Adhikari:

Camp Farewell
Remediation Program, Annual Report 2018

On behalf of Shell Canada Energy, IEG Consultants Ltd. is pleased to submit the Camp Farewell Remediation, Annual Report 2018 in accordance with the requirements of Water Licence N7L1-1834.

Please contact Kyle Schepanow at (403) 648-4292 with any questions or comments.

Yours truly,
IEG CONSULTANTS LTD.

Kyle Schepanow, M.Sc., P.Geo.
Senior Hydrogeologist

KS:sh

IEG Consultants Ltd. • 500 - 2618 Hopewell Place NE • Calgary AB T1Y 7J7 • CANADA
403.274.3424 t • 403.274.5349 f • www.ieg.ca

Shell Canada Energy

Camp Farewell

Camp Farewell Remediation Program, Annual Report 2018

EXECUTIVE SUMMARY

Shell Canada Energy (Shell) retained IEG Consultants Ltd (IEG) and Tervita Corporation (Tervita) to conduct a Remediation Program at Camp Farewell (the Site) located at latitude 69°12'30.0" N and longitude 135°06'04.4" W in the Mackenzie Delta, approximately 125 km northwest of Inuvik and approximately 135 km west of Tuktoyaktuk, Northwest Territories. The field portion of the Remediation Program was conducted between July 18 and September 21, 2018.

The 2018 Remediation Program included the excavation, treatment, and backfilling of the impacted soil at the Site. The conclusions and key findings of the 2018 Remediation Program are as follows:

- The objectives of the 2018 Remediation Program included the following:
  - excavate and remove all polyurethane foam and waste (e.g. metal debris, buried waste, etc.) encountered within the planned excavation extents on the Site;
  - collect additional data on residual petroleum hydrocarbon (PHC) concentrations in the soils at the base of the excavations across the Site;
  - treat excavated soil using the Allu bucket to reduce the residual PHC concentrations in the soil; and
  - maintain compliance with and meet requirements of the applicable permits for the Site.
- A total of 348 soil bags of polyurethane foam and other waste materials were excavated from the Site during the program. While the objective of the program was to remove all polyurethane foam from the Site, the polyurethane foam extending to the top of bank along the southwestern edge of the Site was be excavated and will remain undisturbed by future remediation activities. This decision was made after risks and benefits of foam removal in this area were weighed, and with approval from a GNWT Department of Lands Inspector.
- Selected soil remediation criteria included a combination of GNWT Residential/Parkland guidelines for PHCs in surface soil and the proposed SSRA criteria for soil ≥0.6 m bgs.
- Soil was excavated from 19 of 22 excavation zones and stockpiled on-site from July 20 to September 10, 2018. A total of approximately 30,000 m^3 of soil was excavated during the program. Excavated soil was placed into windrows and treated with an Allu bucket.
- Analytical data collected during the remediation program have indicated that residual soil PHC concentrations have been reduced as a result of the Allu bucket treatment. While there was an overall reduction in PHC concentrations, most of the treated surface soil did not meet the GNWT guidelines at the end of the program.
- Excavated and treated soils were used to backfill excavation areas at the end of the 2018 Remediation Program. Stockpiled soil that had been not been sampled due to the time limitations of the field program was also backfilled at this time. Surfaces were contoured to reduce potential hazards at the Site due to uneven ground and open excavations.

- Confirmatory soil samples collected from the excavation base indicated that soils left in place ≥0.6 m bgs were less than the proposed SSRA criteria of 5000 mg/kg F1-F3 total, with the exception of sample EX18-161, located in zone 10.
- Analytical results of the supplemental soil assessment conducted on the airstrip indicated that historical toluene and PHC fraction F3 exceedances are the result of naturally occurring biogenic organic compounds in the native peat layer beneath the imported gravel fill.
- Following the supplemental soil assessment, a berm was constructed at the approach to the airstrip lease to prevent access and the airstrip side of the approach was scarified.
- Shell maintained compliance with CWS Permit NWT-MBS-18-03 for the duration of the 2018 Remediation Program.
- Part C, Item 1 of Water Licence N7L1-1834 states that Shell is to obtain fresh water from the unnamed lake north of the camp in summer months; however, the intake system required to obtain water from the unnamed lake was removed from the Site in 2013. Shell obtained approximately 100 m^3 of fresh water from the Middle Channel of the Mackenzie River during the 2018 Remediation Program, as outlined in the 2018 Project Description.

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1 INTRODUCTION

Shell Canada Energy (Shell) retained IEG Consultants Ltd. (IEG) and Tervita Corporation (Tervita) to conduct a Remediation Program at Camp Farewell (the Site) located at latitude 69°12'30.0" N and longitude 135°06'04.4" W in the Mackenzie Delta, approximately 125 km northwest of Inuvik and approximately 135 km west of Tuktoyaktuk, Northwest Territories (Figure 1). This report details the activities and findings of the Camp Farewell 2018 Remediation Program.

The 2018 Remediation Program included the excavation, treatment, and backfilling of the impacted soil at the Site. The Program also included confirmatory soil sampling and analysis of excavated areas and treated soils. The soil that was not successfully treated on-site, based on confirmatory sampling results, was backfilled in the excavation to be treated again at a later date. The field portion of the Remediation Program was conducted between July 18 and September 21, 2018.

1.1 Objectives

The primary objectives of the 2018 Remediation Program at the Site were to:

- excavate and remove all polyurethane foam and waste (e.g. metal debris, buried waste, etc.) encountered within the planned excavation extents on the Site;
- collect additional data on residual petroleum hydrocarbon (PHC) concentrations in the soils at the base of the excavations across the Site;
- treat excavated soil using the Allu bucket to reduce the residual PHC concentrations in the soil; and
- maintain compliance with and meet requirements of the applicable permits for the Site.

1.2 Scope of Work

The following scope of work was conducted by Tervita and IEG for the 2018 Remediation Program:

- logistics management and permitting;
- dividing the main portion of the Site (excluding the airstrip) into a grid consisting of 22 zones. Excavating impacted soil in each zone to a depth of 0.6 m below ground surface (bgs), or until permafrost was encountered;
- windrowing excavated soil and treating with an Allu bucket;
- conducting a Global Positioning System (GPS) survey of the Site features and excavation extents with a Trimble GPS unit;
- collecting confirmatory excavation soil samples prior to backfilling, and from windrows of stockpiled soil during treatment;
- backfilling of excavated areas; and
- preparation of the Remediation Program, Annual Report 2018.

IEG was responsible for conducting the following tasks within the overall scope of work:

- logistics management and permitting;
- supervising the excavation of impacted soil;
- collecting confirmatory excavation soil samples;
- collecting confirmatory windrow soil samples;
- conducting a supplemental soil assessment on the airstrip and collecting soil samples for analysis;
- assessing the condition of the current groundwater monitoring network;
- collecting GPS coordinates of excavated areas and Site features;
- supervising the backfill of treated soil into excavated areas; and
- preparing the Camp Farewell Remediation Program, Annual Report 2018.

2 SITE HISTORY

2.1 Site Construction History

Camp Farewell was constructed in the winter of 1970 and summer of 1971. The Site was operated as a staging and storage location to support Shell's Mackenzie Delta Drilling Program. The Site consisted of a self-contained camp, providing electrical and heating services and facilities for accommodation, meals, fuel storage, equipment handling, water withdrawal and wastewater storage.

The Site was constructed on permafrost, and based on its history, the preservation of this layer was taken into account during construction. During construction, a layer of polyurethane (either 50 mm foam or pads) was installed, including 450 mm of compacted gravel, to act as a thermal barrier and to prevent potential contamination of the underlying soils and groundwater.

2.2 Spill History

Approximately 800,000 litres of water impacted with diesel fuel was released from the tank farm in 1981, according to records in the Government of Northwest Territories (GNWT) Hazardous Spills Database. Investigation suggests the spill was a result of vandalism/theft that occurred in the winter of 1980/1981, resulting in the spring release, which was reported to authorities on May 24, 1981. Released fluids overtopped the berm, and due to Site topography, flowed towards the southwest, over the steep banks of the Site and onto the frozen Mackenzie River (WorleyParsons 2011).

Additional detail regarding the actual spill and clean-up efforts is provided in the Komex 2001 report titled "*Phase I and Phase II Environmental Site Assessment of the Shell Farewell Stockpile and Campsite*" (Komex 2001).

2.3 Previous Environmental Investigations

Multiple environmental investigation programs, remediation programs, and other investigations have been conducted at the Site since 2001. IEG has reviewed the available reports concerning these programs and have provided summaries of the programs (Appendix I).

- Golder and Associates (Golder). 2000. Baseline Environmental Site Assessment, Camp Farewell, Mackenzie Delta, Northwest Territories.
- Komex International Ltd. (Komex). 2001. Phase I and Phase II Environmental Site Assessment of the Shell Farewell Stockpile and Campsite.
- WorleyParsons Komex. 2006. 2006 Environmental Site Assessment, Camp Farewell, NT.
- WorleyParsons. 2008. Interim Abandonment and Restoration Program, Camp Farewell, NT.
- WorleyParsons. 2010. 2009 Interim Abandonment and Restoration Program, Camp Farewell, NT.
- IEG Consultants Ltd. (IEG). 2010. 2009 Camp Farewell Hydrocarbon Impacted Soil Remediation Report.
- IEG. 2012. Summary of 2012 Camp Farewell Activities.

- IEG. 2013a. 2012 Annual Report, Type “B” Water Licence #N7L1-1834.
- IEG. 2014. Camp Farewell Lagoon Remediation.
- IEG. 2015. Environmental Supervision during 2014 Decommissioning Program – Amended.
- IEG. 2016a. Camp Farewell 2015 Decommissioning and Soil Assessment Program Report.
- IEG. 2017. Camp Farewell Remediation Program, Annual Report 2016 – Amended.

2.4 Polyurethane Foam Assessment

As part of the Interim Abandonment and Restoration Plan submitted in 2011, WorleyParsons assessed the potential for biodegradation of the polyurethane that makes up the foam urethane layer installed at the Site (included in Appendix II). The assessment concluded that the foam is not susceptible to degradation and that if degradation does occur, the by-products are not particularly soluble. Should degradation occur, a by-product would be nitrogen, and therefore, total nitrogen (as well as nitrate and nitrite) should be a considered target indicator parameter for potential biodegradation of the polyurethane foam in the post-closure groundwater monitoring program (WorleyParsons 2011).

3 PROGRAM LOGISTICS AND PERMITTING

As part of the outlined scope of work, IEG and Shell conducted several tasks concerning logistics management and permitting for the 2018 Remediation Program. Each of these tasks is described in the following sections as per the requirements of the Inuvialuit Water Board (IWB).

3.1 Permitting and Licensing

IEG and Shell obtained permits and licenses prior to commencement of the Remediation Program. The following sections provide information on each permit or licence. Copies of permits and licenses are provided in Appendix III.

3.1.1 Environmental Impact Screening Committee

IEG prepared a Project Description (IEG 2018) for the remediation activities at the Site. The Project Description was sent to the Environmental Impact Screening Committee (EISC) and the GNWT Department of Lands on May 1, 2018. Two agencies responded with comments and/or approval to proceed. Permission to proceed with the Remediation Program was obtained from the EISC on June 12, 2018.

3.1.2 Water Licence

Shell applied for a Type B Water Licence (N7L1-1834) through the Northwest Territories Water Board (NWTWB) on February 28, 2012. The application was to withdraw up to 150 m^3 per day from the Mackenzie River to construct an ice road should remedial activities occur during the winter months and to withdraw up to 50 m^3 for operation of the on-site camp. Water Licence N7L1-1834 was granted on July 18, 2012 for the withdrawal of 150 m^3 per day for industrial undertakings and associated uses. The permit was amended on July 18, 2017 to extend the expiry date to July 17, 2029.

The reporting requirements listed in Water Licence N7L1-1834 are included in Appendix IV.

3.1.3 Canadian Wildlife Service Migratory Birds Sanctuary Permit

The Site lies within the Kendall Island Bird Sanctuary (KIBS), under jurisdiction of Environment Canada. A Canadian Wildlife Service (CWS) Migratory Birds Sanctuary (MBS) permit is required to enter and conduct work within the KIBS and is renewed each year. The CWS permit issued for the 2018 remediation program (NWT-MBS-18-03) was issued on June 28, 2018 and expired on December 31, 2018. A condition of the CWS MBS permit is the submission of an annual report. The 2018 report was submitted to CWS on December 20, 2018 to maintain compliance with the permit.

4 REMEDIATION PROGRAM METHODS

During the 2018 Remediation Program, Tervita was the prime contractor on-site managing and directing Site activities, as well as coordinating logistical and safety aspects of the program. Tervita contracted Mackenzie Delta Integrated Oilfield Services (MDIOS) to provide personnel for the remediation activities. IEG provided environmental supervision and collected soil samples from excavations and windrows of treated soil.

The following sections describe remediation activities conducted by Tervita, MDIOS, and IEG in 2018. Site photographs are provided in Appendix V. A site plan is shown on Figure 2.

4.1 Camp Mobilization/Demobilization

A barge camp was mobilized to the Site from Inuvik on July 16, 2018 via the Mackenzie River. The barge was anchored to bollards in the boat docking area at the Site (Appendix V, Photo 1; Figure 2). The barge comprises three levels, consisting of a kitchen and dining unit, a common lounge area, sleeping accommodations, office space, mud room, and a heli-pad. A fuel spill kit, generators, and a wastewater tank were also contained on the barge. Wastewater from the barge was disposed of in Inuvik. The barge was operated and maintained by a barge master for the duration of Site activities. On September 26, 2018 the barge was demobilized from the Site via the Mackenzie River.

4.2 Soil Excavations and Windrows

Soil was excavated from portions of 19 of the 22 delineated excavation zones and stockpiled on-site from July 20 to September 10, 2018. Soil was excavated to a minimum depth of 0.6 m bgs, or until permafrost was encountered (Appendix V, Photo 2). Excavation activities were started in the northwest section of the Site to continue work in areas that had been excavated and partially treated in 2016 (zones 2, 3, 4, 10, and 11). The excavation zones are shown on Figure 3.

Excavated soil was placed into windrows established on the Site from July 20 to September 10, 2018. The windrowed soil was treated with an Allu bucket excavator attachment provided by MDIOS from July 20 to September 15, 2018 (Appendix V, Photo 3). Windrow soil samples were collected following the first treatment with the Allu bucket to characterize the remaining soil PHC concentrations, evaluate remediation efforts, or to confirm remediation success.

4.3 Soil Sampling

Previous assessments established that the contaminants of concern (COCs) at the Site were PHCs, that included benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC fractions F1 to F4 concentrations. A total of 173 discrete confirmatory soil samples were collected from the excavation base area during the 2018 Remediation Program. Soil samples were collected on an approximately 20 m by 20 m grid from each of the excavations and submitted for analysis of BTEX and PHC fractions F1 to F4 concentrations. A total of 171 composite soil samples were collected from the windrows during the remediation program. Windrow samples were also analyzed for BTEX and PHC fractions F1 to F4 concentrations.

Excavation and windrow soil samples collected were placed directly into clear glass jars equipped with Teflon-lined lids for laboratory analysis and into sterile plastic bags for field screening. Terra Core® Samplers were used to collect a 10 mL sample for placement into a Volatile Organic Analysis (VOA) vial containing 40 mL of methanol as a preservative. Field screening involved measuring the organic vapor concentration in the headspace of sample bags using an RKI Eagle organic vapor analyzer (OVA). Field screening results are provided in Appendix VI (Table 1).

Standard chain-of-custody protocol was followed for collected soil samples. Soil samples were stored in sealed coolers with frozen ice packs prior to being submitted to AGAT Laboratories (AGAT) in Edmonton, Alberta. AGAT is accredited by the Canadian Associations for Environmental Analytical Laboratories for the analyses performed.

The coordinates of each excavation soil sample location were measured and recorded using a Trimble GPS. The equipment used provides real time measurement of position and elevation with a positional accuracy of less than 1 m (generally less than 0.5 m) and less than 2 m in elevation. The coordinates were recorded in UTM NAD 83 (Zone 8N).

4.4 Polyurethane Foam and Waste Excavation

Waste materials uncovered during excavation activities (i.e. polyurethane foam and miscellaneous debris) were placed into 1 m^3 soil bags (Appendix V, Photo 4) for appropriate offsite disposal. Polyurethane foam was manually removed from the excavation by MDIOS laborers and was separated from other uncovered waste materials. Packed soil bags were moved out of the excavation using a loader and stored at the staging area located southeast of Shed #1 for the duration of the program (Appendix V, Photo 5).

4.5 Backfilling

Prior to demobilization from Site, treated and stockpiled soil was backfilled into the excavated areas across the Site. Stockpiled soil that had been not been sampled due to the time limitations of the field program was also backfilled at this time. The decision to backfill the excavations with soil that had not been sampled and/or required further treatment was made for the following reasons:

- to maintain adequate drainage across the Site;
- to provide cover to protect the permafrost that exists below the gravel fill at the Site; and
- to remove potential safety hazards associated with uneven areas and open excavations.

Excavated soil was backfilled into the excavated areas at the Site by MDIOS from September 11 to 21, 2018, under the direction of Tervita. After backfilling, the Site was graded and contoured to reflect the natural topography (Appendix V, Photo 6).

Prior to backfilling, the excavation extents and general locations of the placement of the soil requiring further treatment were recorded via GPS so that surface soils can be re-excavated for further treatment or treated in place via landfarming in 2019. The placement of the treated windrowed soil within the excavation extents is outlined in Figure 4. Following the placement of the soil there was further spreading of the material to regrade the surface. As a result, there is some uncertainty

regarding the final resting place of the treated soils from the windrows, but the general location is known. Analytical results from the sampled soils are included in Appendix VI.

4.6 Airstrip Soil Assessment

During the 2015 soil assessment at the Site, toluene and PHC fraction F3 were detected at concentrations exceeding the GNWT guidelines in multiple soil samples collected from the airstrip. The maximum concentrations of toluene and PHC fraction F3 reported at the airstrip were 52.9 mg/kg and 1,1160 mg/kg, respectively (BH15-008 at 1 to 1.5 m bgs) (IEG 2016). As other BTEX compounds and F2 were reported at concentrations below the GNWT guidelines, the possibility that the elevated toluene and F3 concentrations were a result of an aviation or diesel fuel spill was considered unlikely.

Naturally occurring hydrocarbons in organic materials (e.g. peat or compost) may cause false PHC guideline exceedances (AEP 2018). Thus, evaluation of the airstrip data suggests that it is likely that toluene and F3 detected in the soil samples could be from a naturally occurring source, and not the result of a fuel spill.

A supplemental soil assessment was conducted at the airstrip during the 2018 Remediation Program to further investigate areas where toluene and F3 had previously been detected at levels exceeding the GNWT guidelines. On July 29, 2018, five boreholes were advanced on the airstrip to a maximum depth of 1.1 m bgs using a hand auger (Figure 2). Soil samples were visually examined, logged, and field screened with an OVA. Soil samples were placed directly into clear glass jars equipped with Teflon-lined lids for laboratory analysis and into sterile plastic bags for field screening. Terra Core® Samplers were used to collect a 10 mL sample for placement into a Volatile Organic Analysis (VOA) vial containing 40 mL of methanol as a preservative. Select soil samples were submitted for laboratory analysis of BTEX and PHC fractions F1 to F4 concentrations. Where applicable, samples with elevated F3 concentrations were further analyzed for subfractions “PHC F3a” and “PHC F3b” for interpretation using the Biogenic Interference Calculation (BIC) Scale. The BIC Scale is described in Appendix VII.

4.7 Quality Assurance and Quality Control

Quality assurance and quality control measures were implemented while collecting, storing, shipping, and analyzing the samples collected during this investigation. These measures included the following activities:

- donning new nitrile and/or latex gloves prior to the collection of each sample and/or subsequent to contact with soil while sampling;
- using both GPS and field measurements to record the sample locations;
- cleaning and decontaminating any sampling tools and/or equipment prior to collecting each sample and/or subsequent to contact with soil while sampling;
- labelling samples with a unique identifier;
- storing samples in clean and appropriate laboratory supplied sample jars and vials;

- storing samples in ice packed coolers where appropriate to maintain samples near the recommended 4°C temperature; and
- shipping samples to an accredited laboratory for analyses following standard chain-of-custody protocol.

The quality assurance and quality control (QA/QC) protocols are provided in Appendix VIII.

5 REGULATORY FRAMEWORK

The guidelines for organic and inorganic parameters in soil, sediment and water are provided by the Canadian Council of Ministers of the Environment (CCME), *Canadian Environmental Quality Guidelines* (CEQG), 1999 (with updates). The CCME CEQG provides guidelines for four primary land uses; "Agricultural", "Residential/Parkland", "Commercial", and "Industrial", and two soil types; "Fine" and "Coarse" grained soil, defined as having a median grain size of <75 μm or >75 μm, respectively (CCME 2006).

Guidelines for salinity, trace metals, PHC, and PAH parameters in soil are provided by the *Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil* (CCME 2008), as well as by the *Environmental Guideline for Contaminated Site Remediation* (GNWT 2003). The GNWT Contaminated Site Remediation (CSR) guideline defines the same land uses and soil textures as CCME CEQG. The GNWT CSR further identifies guidelines for surface soil (0 m to 1.5 m depth) and subsoil (>1.5 m depth), as well as site-specific pathways that apply to PHCs F1 to F4 in soil, including "soil ingestion", "nutrient cycling", and "ecological soil contact", among others.

The following information was used to determine the applicable assessment guidelines and exposure pathways for soil at the Site:

- the southern and western edges of the Site are adjacent to the Middle Channel of the Mackenzie River;
- the surface water bodies are capable of sustaining aquatic life;
- the Mackenzie River is generally at a distance greater than 10 m from areas of excavation;
- there are no domestic water wells on, or within a 1 km radius of the Site;
- there are no slab-on-grade residential structures on the Site;
- soils at the Site consist of a thin organic layer overlying a coarse-grained, sandy layer;
- the maximum depth of investigation was approximately 7.5 m bgs; and
- based on the land use definitions in the GNWT CSR guideline, current and likely future land use for the Site and surrounding properties is "Residential/Parkland".

5.1 Site-Specific Risk Assessment

Risk assessment is a remediation strategy implemented at appropriate sites as an alternative to physical remediation. Risk assessment directly evaluates whether impacted materials in situ pose a risk to existing receptors in a given environment.

A Screening Level Risk Assessment for the soils at Site was conducted by GatePost Risk Analysis (GPRA) in January 2017 (GPRA 2017). Subsequent to that assessment, GPRA was retained by Shell to conduct a Site-Specific Risk Assessment (SSRA) for the Site to provide further quantitative support for a risk-based approach to Site remediation.

The Screening Level Risk Assessment compared concentration statistics in the areas of potential concern at the Site to the GNWT (2003) and evaluated the potential exposure pathways for human health and environmental receptors at the Site. The SSRA then calculated the hazard quotients and incremental lifetime cancer risk for relevant ecological receptors that may use the Site. Additionally, the SSRA calculated risk-based concentrations for BTEX and PHC fractions F1 to F3, and established the maximum threshold concentrations that can be considered safe for each of the ecological receptors that could have either direct or dietary exposure to invertebrates and plants on the Site, or to soil ingested incidentally during foraging (GPRA 2018).

The SSRA found that both vapour inhalation and groundwater pathways could be eliminated for soil at the Site, leaving soil contact as the final remaining operable pathway for exposure. The SSRA noted, however, that exposure via subsoil on the Site is unlikely. The SSRA concluded that human and wildlife receptors using the Site are at very low or no risk of adverse effects. While calculations for robins and masked shrews indicated that estimated exposures to F2 and F3 in the subsoil could exceed risk-based dose amounts, there were safety factors inherent within the exposure and risk calculations for both species. The remote likelihood of exposure to the extent used in the calculations, and fact that the highest PHC concentrations are confined to the tank farm area, mean it is unlikely that either species would be affected by PHCs.

The SSRA also concluded that removal of material below 0.6 m bgs is not required to reduce risks below acceptable levels but recommended that maximum concentration “hotspots” of PHC fractions in the subsurface soil should be removed to avoid future condensation to liquid phase. The SSRA concluded that a 5000 mg/kg management limit for PHC fractions F1 to F3 in subsurface soil (≥0.6 m bgs) is considered to be adequate to achieve this goal (GPRA 2018).

The complete GPRA SSRA report is provided in Appendix IX.

5.2 Soil Quality Criteria

Based on the land use of the Site and the surrounding properties, the analytical results for BTEX in surface soil were compared to the “Residential/Parkland” soil guidelines found in the GNWT *Environmental Guideline for Affected Site Remediation* (GNWT 2003).

The analytical results for PHC fractions F1 (C_6-C_{10}), F2 (C_{10}-C_{16}), F3 (C_{16}-C_{34}) and F4 (C_{34}-C_{50}) in surface soil were compared to the GNWT guidelines for coarse-textured surface soil (0 m to 1.5 m). The limiting exposure pathways are “protection of groundwater for aquatic life” and “ecological soil contact”. Although the Mackenzie River is generally at a distance greater than 10 m from the delineated excavation zones at the Site, the “protection of groundwater for aquatic life” pathway was not eliminated in order to apply a more conservative remediation approach that would be consistent with previous remediation activities conducted at the Site. However, GPRA (2018) does present the elimination of this exposure pathway as part of the SSRA, and this will be considered in future remediation activities. The “protection of potable groundwater” pathway is excluded based on the depth of permafrost in the region.

Based on the recommendations of the SSRA, a criteria of 5000 mg/kg PHC F1 to F3 total was applied for subsurface soil (<0.6 m bgs) confirmatory samples collected from the excavation base.

A summary of the applicable guidelines and limiting pathways for surface and subsurface soils at the Site are provided in Table 5.1.

Table 5.1 Applicable Assessment Guidelines and Exposure Pathways for Soil at the Site

Parameter	Guideline (mg/kg)	Land Use/Grain Size/Limiting Pathway
Surface Soil (<0.6 m bgs)		
Benzene	0.5	Residential/Parkland
Toluene	0.8	Residential/Parkland
Ethylbenzene	1.2	Residential/Parkland
Xylenes	1	Residential/Parkland
F1	130	Residential, Coarse-Grained, Ecological Soil Contact
F2	150	Residential, Coarse-Grained, Protection of Groundwater for Aquatic Life
F3	400	Residential, Coarse-Grained, Ecological Soil Contact
F4	280	Residential, Coarse-Grained, Ecological Soil Contact
Subsurface Soil (≥0.6 m bgs)		
F1-F3 total	5000	Proposed SSRA Criteria

6 REMEDIATION PROGRAM RESULTS

6.1 Polyurethane Foam and Waste Excavation

Excavation at the Site continued laterally until the extents of the polyurethane foam were determined and the encountered foam was removed. A total of 348 soil bags of polyurethane foam and other waste materials were excavated from the Site in 2018. At the end of the program, soil bags were placed in Shed #1 for winter storage. Polyurethane foam will be removed from the Site and disposed of at an appropriate facility in 2019. The other waste was separated from the polyurethane foam and will also be removed from the Site and transferred to an appropriate facility in 2019.

During the 2018 Remediation Program, following discussions with the GNWT Department of Lands Inspector, it was decided that the polyurethane foam extending to the top of bank along the southwestern edge of the Site would not be excavated and will remain undisturbed by future remediation activities. While the exact extent of the foam could not be recorded via GPS due to the safety hazard associated with working along the edge of the bank, the potentially affected area is highlighted on Figure 3. Based on WorleyParsons' 2011 assessment, which concluded there is a low risk for degradation of the foam (see Section 2.4), it was determined that the benefits of removing the foam in this area were outweighed by the potentially damaging effects of vegetation removal and increased risk of erosion along the river bank. This approach was verbally approved on-site by a GNWT Department of Lands Inspector. Shell proposes to conduct shoreline monitoring and clean-up of foam that may erode from the top of bank during post-closure monitoring programs, for a proposed period of five years.

6.2 Confirmatory Soil Sample Results

During the 2018 Remediation Program, portions of 19 of the 22 zones (approximately 5.1 ha) were excavated to a minimum depth of 0.6 m bgs, or until permafrost was encountered. Confirmatory soil samples were collected from the base of the excavation to confirm that soils left in place ≥0.6 m bgs met the applicable GNWT guidelines or were less than the proposed SSRA criteria of 5000 mg/kg F1-F3 total prior to backfilling. Twelve soil samples (EX18-004 to EX18-009 and EX18-013 to EX18-018) were collected at 0.3 m bgs in an area that was subsequently excavated to 0.6 m bgs and were re-sampled. These results are considered as interim results only. Based on the reported analytical results, at the completion of the 2018 Remediation Program there were 86 excavation base samples that met the applicable GNWT guidelines, and 74 excavation base samples that exceeded the applicable GNWT guidelines but were below the proposed SSRA criteria. There was only one excavation base sample, located in zone 10 (EX18-161), that exceeded the proposed SSRA criteria. This area will be further addressed in 2019.

The confirmatory soil analytical results are summarized in Appendix VI (Table 1) and laboratory analytical reports are presented in Appendix X. Locations of all confirmatory excavation base samples are shown on Figure 3, along with the extent of the area excavated in 2018.

6.3 Windrow Soil Sample Results and Soil Volumes

Composite soil samples were collected from 22 windrows of treated soil on-site between July 26 and September 10, 2018. Windrow soil analytical results along with sample dates are summarized in Appendix VI (Table 2) and laboratory analytical reports are presented in Appendix X.

A total of approximately 30,000 m^3 of surface soil was excavated from 19 excavation zones and treated during the 2018 Remediation Program. Analytical data collected during the remediation program have indicated that residual soil PHC concentrations have been reduced as a result of the Allu bucket treatment. Analytical results of confirmatory sampling of the treated and sampled windrow soil stockpiles indicated that there was an overall reduction in soil PHC concentrations; however, most of the treated soil did not meet the GNWT guidelines at the end of the 2018 Remediation Program. Further treatment of soil containing residual PHCs will be conducted during the 2019 remediation program. Excavated and treated soil was backfilled into the excavated areas at the Site and contoured to avoid leaving potential hazards of uneven ground or open excavations. The excavation extents were recorded with a hand-held Trimble GPS unit, and are shown on Figures 3 and 4.

6.4 Airstrip Soil Assessment

The soil profile observed in boreholes advanced during the supplemental soil assessment at the airstrip generally consisted of coarse-grained, sandy gravel fill overlying native peat to the maximum depth investigated (1.1 m bgs). The observed soil profile is shown on borehole logs included in Appendix XI.

Field screening results indicated that concentrations of organic vapors ranged from 0 ppm (multiple samples) to 130 ppm at BH18-01 (0 to 0.3 m bgs). OVA field screening results are included on the borehole logs in Appendix XI and in Appendix VI (Table 3).

Concentrations of the analyzed PHC parameters were less than the GNWT guidelines in the submitted soil samples, except for PHC fraction F3 at a concentration of 500 mg/kg in borehole BH18-04 (0.6 to 0.9 m bgs) (Appendix VI, Table 3). As peat was encountered at 0.7 m bgs in this borehole and the sample was collected from the peat interval, further laboratory analysis of PHC subfractions F3a and F3b was requested to determine the BIC value. A summary of the applicable PHC concentrations and BIC value is provided in Table 6.1.

Table 6.1 Borehole BH18-04 BIC Value Summary

Parameter	Value
PHC F2	<10 mg/kg (assume 10 mg/kg for calculation)
PHC F3	500 mg/kg
PHC F3a	40 mg/kg
PHC F3b	460 mg/kg
BIC	$= \frac{10\ mg/kg}{10\ mg/kg + 460\ mg/kg} \times 100$
BIC Value	2.13%

An interpretation of the results using the BIC Scale therefore indicated that the F3 result was a false exceedance of the PHC F3 fraction guideline (BIC value <10%), and indicative of naturally occurring biogenic organic compounds (e.g. peat).

The results of the supplemental soil assessment conducted on the airstrip indicate that historical toluene and PHC fraction F3 exceedances are the result of naturally occurring hydrocarbons in the native peat layer beneath the imported gravel fill.

Following the supplemental soil assessment, the approach to the airstrip lease was blocked to prevent access and the airstrip side of the approach was scarified to promote vegetation growth (Appendix V, Photo 7).

6.5 Quality Assurance and Quality Control

For quality assurance purposes, 21 replicate samples were collected for analysis of PHC parameters during the 2018 Remediation Program. The samples were submitted to the laboratory as blind replicates. The submitted replicate samples included nine replicates of excavation base confirmatory soil samples, 11 replicates of windrow soil samples, and one replicate borehole soil sample.

The laboratory results for the replicate and original samples were compared and evaluated for quality on the basis of either relative percent difference (RPD) or absolute difference (AD). Four parameters (toluene and F2 to F4) were identified above the Zeiner (1994) criteria in the QA/QC review for results received under AGAT work orders 18E368251, 18E369461, 18E370282, 18E375383, 18E378347, 18E381561, and 18E384433; and are considered estimates only. The remainder of the analytical program is considered to have an acceptable level of precision.

The QA/QC program included laboratory QA/QC protocols which are provided in Appendix VIII. QA/QC results are presented in Appendix VI (Table 4). Laboratory quality assurance reports and analytical methods are presented in Appendix X.

6.6 Challenges and Setbacks

The success of the soil treatment with an Allu bucket requires the volatilization of PHCs from impacted soil. Challenges and setbacks during the 2018 Remediation Program included cool weather and rainy periods, as the rate and extent of volatilization of PHCs in soil is improved with dry conditions at increased temperatures.

7 CONCLUSIONS

Shell retained IEG and Tervita to conduct the 2018 Remediation Program at the Site from July to September 2018. The 2018 Remediation Program included the excavation, treatment, and backfilling of the impacted soil on-site. The conclusions and key findings of the 2018 Remediation Program are as follows:

- The objectives of the 2018 Remediation Program included the following:
  - excavate and remove all polyurethane foam and waste encountered within the planned excavation extents on the Site;
  - collect additional data on residual PHC concentrations in the soils at the base of the excavations across the Site;
  - treat excavated soil using the Allu bucket to reduce the residual PHC concentrations in the soil; and
  - maintain compliance with and meet requirements of the applicable permits for the Site.
- A total of 348 soil bags of polyurethane foam and other waste materials were excavated from the Site during the program. While the objective of the program was to remove all polyurethane foam from the Site, the polyurethane foam extending to the top of bank along the southwestern edge of the Site was be excavated and will remain undisturbed by future remediation activities. This decision was made after risks and benefits of foam removal in this area were weighed, and with approval from a GNWT Department of Lands Inspector.
- Selected soil remediation criteria included a combination of GNWT Residential/Parkland guidelines for PHCs in surface soil and the proposed SSRA criteria for soil ≥0.6 m bgs.
- Soil was excavated from 19 of 22 excavation zones and stockpiled on-site from July 20 to September 10, 2018. A total of approximately 30,000 m^3 of soil was excavated during the program. Excavated soil was placed into windrows and treated with an Allu bucket.
- Analytical data collected during the remediation program have indicated that residual soil PHC concentrations have been reduced as a result of the Allu bucket treatment. While there was an overall reduction in PHC concentrations, most of the treated surface soil did not meet the GNWT guidelines at the end of the program.
- Excavated and treated soils were used to backfill excavation areas at the end of the 2018 Remediation Program. Stockpiled soil that had been not been sampled due to the time limitations of the field program was also backfilled at this time. Surfaces were contoured to reduce potential hazards at the Site due to uneven ground and open excavations.
- Confirmatory soil samples collected from the excavation base indicated that soils left in place ≥0.6 m bgs were less than the proposed SSRA criteria of 5000 mg/kg F1-F3 total, with the exception of sample EX18-161, located in zone 10.
- Analytical results of the supplemental soil assessment conducted on the airstrip indicated that historical toluene and PHC fraction F3 exceedances are the result of naturally occurring biogenic organic compounds in the native peat layer beneath the imported gravel fill.

- Following the supplemental soil assessment, a berm was constructed at the approach to the airstrip lease to prevent access and the airstrip side of the approach was scarified.
- Shell maintained compliance with CWS Permit NWT-MBS-18-03 for the duration of the 2018 Remediation Program.
- Part C, Item 1 of Water Licence N7L1-1834 states that Shell is to obtain fresh water from the unnamed lake north of the camp in summer months; however, the intake system required to obtain water from the unnamed lake was removed from the Site in 2013. Shell obtained approximately 100 m^3 of fresh water from the Middle Channel of the Mackenzie River during the 2018 Remediation Program, as outlined in the 2018 Project Description.

8 FUTURE SITE WORK

Shell's Remediation Program is anticipated to continue in 2019. Future activities planned for the Site include the following:

- Removing Shed #1 from the Site.
- Conducting a preliminary soil sampling program to determine the residual PHC concentrations in surficial soils (<0.6 m bgs) at the Site prior to the start of the 2019 Remediation Program. The Site will be divided into an appropriate grid system and surface soil samples will be collected for analysis of PHC parameters. The analytical results will be used to divide and prioritize areas of the Site for remedial activities to be completed in 2019.
- Further treatment of partially treated surface soil (<0.6 m bgs) in excavation zones where confirmatory samples from the excavation base met the proposed SSRA criteria. Treatment will be conducted either through landfarming (tilling in place) or re-excavation, windrowing, and treatment with an Allu Bucket.
- Further addressing subsurface soil (≥0.6 m bgs) in zone 10, in the vicinity of excavation base sample EX18-161, which exceeded the proposed SSRA criteria.
- Excavating, sampling and treating soils in areas that were not excavated during the 2018 remediation program at the Site.

9 CLARIFICATIONS OF THIS REPORT

The report's findings are based on conditions that existed at the time of 2018 field program and should not be relied upon to precisely represent conditions at any other time. The conclusions in the report are based on IEG Consultant Ltd.'s observation of existing site conditions and on soil sampling and chemical testing. The concentrations of contaminants measured may not be representative of conditions between locations sampled. Be aware that conditions may change with time. Conclusions about site conditions under no circumstances comprise a warranty that conditions in all areas within the site and beneath structures are of the same quality as those sampled. Note also that changes in environmental regulations and interpretations may occur at any time and such changes could affect the extent of remediation required. Any additional information about the site that becomes available should be provided to IEG Consultants Ltd. for review and modification of its recommendations, as necessary.

This report is an instrument of service of IEG Consultants Ltd. The report has been prepared for the exclusive use of Shell Canada Energy for the specific application to the Camp Farewell Remediation Program. The report's contents may not be relied upon by any party other than Shell without the express written permission of IEG Consultants Ltd. In this report, IEG Consultants Ltd. has endeavoured to comply with generally-accepted professional practice common to the local area. IEG Consultants Ltd. makes no warranty, express or implied.

10 CLOSING

If you have any questions or comments regarding the above information, please contact Kyle Schepanow at (403) 648-4292.

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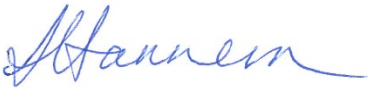

Stephanie Hannem, P.Ag.
Environmental Scientist

Kyle Schepanow, M.Sc., P.Geo.
Senior Hydrogeologist

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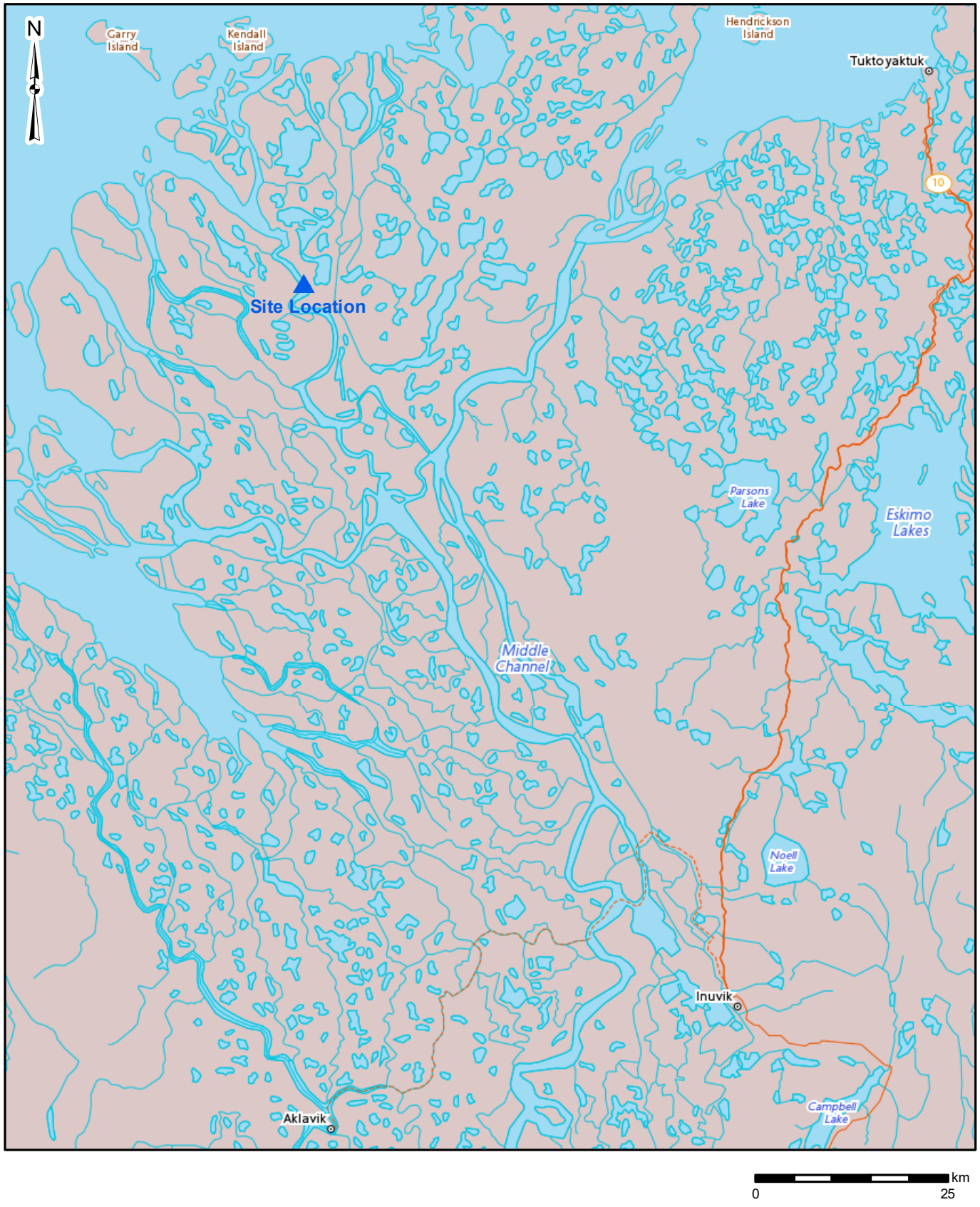
FIGURES



NOTES:

1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 8N
3. IMAGE SOURCE: The Toporama Web Map Service, http://wms.ess-ws.nrcan.gc.ca/wms/toporama_en, Government of canada, Natural Resources Canada, Earth Sciences Sector

CLIENT: Shell Canada Energy

IEG CONSULTANTS LTD.

PROJECT: Camp Farewell Remediation Program, Annual Report 2018

TITLE: Camp Farewell Site Location Map

SCALE	PROJECT No.	FIG No.
1:700,000	A04012A10	1

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Date: January 22, 2019
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N

P06-1

TUNDRA

BH18-05

BH18-04

P06-2

BH18-03

BH18-02

BH18-01

TANK FARM

TUNDRA

WILLOWS

P06-7

FUEL TANK

P06-6

REMEDIATED LAGOON

CAMP BUILDING

SHED #1

SHED #2

SHED #3

P06-4

P06-3

ROAD (GRASS) WINTER ACCESS

P06-5

ROAD (GRAVEL) SUMMER ACCESS

MACKENZIE RIVER

BOLLARDS

Legend

- Borehole Location
- Borehole with Soil Sample Exceeding GNWT Guideline
- Piezometer
- Former Aboveground Storage Tank
- Airstrip
- Removed infrastructure
- Boundary
- Edge of Gravel
- River
- Sand
- Top of Bank

0 100 m

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 8N
3. SOURCE: Site survey plan prepared for Shell Canada Limited by Inukshuk Geomatics Inc.; original scale 1:2000.

CLIENT: Shell Canada Energy

IEG CONSULTANTS LTD.

PROJECT: Camp Farewell Remediation Program, Annual Report 2018

TITLE: Site Plan with Airstrip Borehole Locations

SCALE	PROJECT No.	FIG No.
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N

TUNDRA

WILLOWS

REMEDIATED LAGOON

SHED #1

MACKENZIE RIVER

ROAD (GRAVEL)

SUMMER ACCESS

BOLLARDS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

EX18-001 EX18-002 EX18-003 EX18-004 EX18-005 EX18-006 EX18-007 EX18-008 EX18-009 EX18-010 EX18-011 EX18-012 EX18-013 EX18-014 EX18-015 EX18-016 EX18-017 EX18-018 EX18-019 EX18-020 EX18-021 EX18-022 EX18-023 EX18-024 EX18-025 EX18-026 EX18-027 EX18-028 EX18-029 EX18-030 EX18-031 EX18-032 EX18-033 EX18-034 EX18-035 EX18-036 EX18-037 EX18-038 EX18-039 EX18-040 EX18-041 EX18-042 EX18-043 EX18-044 EX18-045 EX18-046 EX18-047 EX18-048 EX18-049 EX18-050 EX18-051 EX18-052 EX18-053 EX18-054 EX18-055 EX18-056 EX18-057 EX18-058 EX18-059 EX18-060 EX18-061 EX18-062 EX18-063 EX18-064 EX18-065 EX18-066 EX18-067 EX18-068 EX18-069 EX18-070 EX18-071 EX18-072 EX18-073 EX18-074 EX18-075 EX18-076 EX18-077 EX18-078 EX18-079 EX18-080 EX18-081 EX18-082 EX18-083 EX18-084 EX18-085 EX18-086 EX18-087 EX18-088 EX18-089 EX18-090 EX18-091 EX18-092 EX18-093 EX18-094 EX18-095 EX18-096 EX18-097 EX18-098 EX18-099 EX18-100 EX18-101 EX18-102 EX18-103 EX18-104 EX18-105 EX18-106 EX18-107 EX18-108 EX18-109 EX18-110 EX18-111 EX18-112 EX18-113 EX18-114 EX18-115 EX18-116 EX18-117 EX18-118 EX18-119 EX18-120 EX18-121 EX18-122 EX18-123 EX18-124 EX18-125 EX18-126 EX18-127 EX18-128 EX18-129 EX18-130 EX18-131 EX18-132 EX18-133 EX18-134 EX18-135 EX18-136 EX18-137 EX18-138 EX18-139 EX18-140 EX18-141 EX18-142 EX18-143 EX18-144 EX18-145 EX18-146 EX18-147 EX18-148 EX18-149 EX18-150 EX18-151 EX18-152 EX18-153 EX18-154 EX18-155 EX18-156 EX18-157 EX18-158 EX18-159 EX18-160 EX18-161 EX18-162 EX18-163 EX18-164 EX18-165 EX18-166 EX18-167 EX18-168 EX18-169 EX18-170 EX18-171 EX18-172 EX18-173

Legend

Excavation Base Samples

- Interim Excavation Sample (Excavated and Re-Sampled at 0.6 m bgs)
- Excavation Base Sample Less Than GNWT Guideline and SSRA Criteria
- Excavation Base Sample Less Than SSRA Criteria Only
- Excavation Base Sample Exceeds SSRA Criteria
- Boundary
- Edge of Gravel
- River
- Sand
- Top of Bank
- Approximate Boundary of Area Successfully Treated in 2016
- Area Potentially Affected by Remaning Polyurethane Foam
- Excavation Zones

0 100 m

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 8N
3. SOURCE: Site survey plan prepared for Shell Canada Limited by Inukshuk Geomatics Inc.; original scale 1:2000.
4. GNWT - Government of the Northwest Territories
5. SSRA - Site-Specific Risk Assessment

CLIENT: Shell Canada Energy

IEG CONSULTANTS LTD.

PROJECT: Camp Farewell Remediation Program, Annual Report 2018

TITLE: Site Plan with Excavation and Confirmatory Sampling Locations

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N

TUNDRA

WILLOWS

WR 19 3

WR 18/22

WR 26

WR 25

WR 21

WR 27W

WR 27E

WR 24

WR 23W

WR 23E

WR 30

WR 29

WR 19

REMEDIATED LAGOON

SHED #1

MACKENZIE RIVER

ROAD (GRASS)

WINTER ACCESS

ROAD (GRAVEL)

SUMMER ACCESS

BOLLARDS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Legend

- Boundary
- Edge of Gravel
- River
- Sand
- Top of Bank
- Unsampled Stockpiled Surface Soil
- Sampled Stockpiled Surface Soil
- Approximate Boundary of 2018 Excavation
- Approximate Boundary of Area Successfully Treated in 2016
- Excavation Zones

0 100 m

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM Zone 8N
3. SOURCE: Site survey plan prepared for Shell Canada Limited by Inukshuk Geomatics Inc.; original scale 1:2000.
4.WR - Windrow

CLIENT: Shell Canada Energy

IEG CONSULTANTS LTD.

PROJECT: Camp Farewell Remediation Program, Annual Report 2018

TITLE: Approximate Location of Windrows Prior to Backfilling/Spreading

SCALE	PROJECT No.	FIG No.
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APPENDIX I

Historical Reports

Appendix I
Camp Farwell Annual Reports

I-1 PREVIOUS ENVIRONMENTAL SITE ASSESSMENT PROGRAMS

I-1.1 2000

In 2000, Golder and Associates (Golder) conducted a baseline environmental assessment of the Site and Geco-Prakla, a division of Schlumberger Canada, conducted a baseline assessment prior to sub-leasing a portion of the Site from Shell. The area of the sub-lease included the main camp accommodations, associated accommodation trailers, the lagoon area and the area south of the storage crates and racks (including Shed #1) and extended to the east of the Shell lease (Worley Parsons 2011).

I-1.2 2001

Phase I and Phase II Environmental Site Assessments (ESAs) were conducted by Komex in 2001. Analyzed parameters reported to exceed applicable guidelines which included: total petroleum hydrocarbons (TPHs), polycyclic aromatic hydrocarbons (PAHs), and selected trace metals within (and down gradient of) the burn pit; xylenes and TPHs in the area of the tank farm and the area of the historical tank release; TPHs and barium concentrations from surface stained areas and throughout the gravel base pad; and electrical conductivity (EC) and pH on the base pad where mud additives were reportedly stored.

In addition, two background samples were collected from locations located to the northeast of the Site and sub-lease; one situated in native tundra (organic soil) and the second located on the gravel airstrip (mineral soil). Salinity parameters, including EC (180 to 360 uS/cm), pH (6.3 to 8.0) and sodium adsorption ratio (SAR) (0.9 to 1.1) were reported within the applicable guidelines for residential/parkland and industrial land uses for both locations. Concentrations of metals parameters were reported below applicable guidelines (WorleyParsons Komex 2006).

Following the ESAs conducted in 2001, Komex submitted an Interim Abandonment and Restoration Plan to the NWTWB (Komex 2002).

I-1.3 2006

A more detailed Phase II ESA was conducted by WorleyParsons Komex in 2006. The purpose of the additional Phase II ESA was to further delineate previously identified soil impacts and to identify potential groundwater impacts.

Two background soil and groundwater sample locations were established and tested to the northeast of the Site, in areas not likely to have been affected by historical operations. Background soil locations were advance to 0.4 m bgs, to the depth of permafrost. Findings for the background soil and groundwater locations indicated concentrations of hydrocarbons which were attributed to naturally occurring organic material. Salinity parameters EC, pH, and SAR were reported at 251 uS/cm, 6.7, and

0.6, respectively, within and/or below applicable guidelines (WorleyParsons Komex 2006). Metals parameters were not analyzed.

Hydrocarbon impacts were identified in the vicinity of the burn pit, tank farm, above ground fuel storage tanks, and across the gravel pad including the perimeter. Salinity and barium impacts were identified on the gravel pad (WorleyParsons Komex 2006).

I-1.4 2008

WorleyParsons submitted a second Interim Abandonment and Restoration Plan in 2008 following the 2006 Phase II ESA. A summary of the 2006 results were included as well as specific Progressive Reclamation Plans to be conducted in 2009 and 2010 (WorleyParsons 2008).

I-1.5 2010

WorleyParsons submitted an updated Interim Abandonment and Restoration Plan that described the activities that were conducted in 2008 and 2009 (WorleyParsons 2011).

IEG also summarized the 2008 and 2009 Site activities in the 2009 Camp Farewell Hydrocarbon Impacted Soil Remediation Report (IEG 2010). The 2006 Phase II ESA results were summarized, and the remediation activities were described in detail, including the sampling schedule and results.

I-1.6 2012

IEG conducted required Site inspections and collected water samples from the lagoon. Site inspections indicated no sign of spills, leaks, and animal or human activity on the Site. Laboratory analytical results for water samples reported values below applicable guidelines and lagoon water was subsequently discharged to the Mackenzie River in accordance with licence number N7L1-1834 (IEG 2012, IEG 2013a).

I-1.7 2013

In 2013, IEG conducted a remediation program at the former lagoon at Camp Farewell. The lagoon excavation was located on the west side of the camp building with the Mackenzie River bordering the south and east sides. The dimensions of the excavation were approximately 52 m by 34 m. The maximum depth of the excavation was approximately 7.5 m. Prior to remedial activities, the lagoon had a depth of approximately 2.5 m. Domestic waste debris was observed in the excavated material, including metal cans, fragments, and plastic debris. Water supply facilities and sewage treatment facilities were also decommissioned and removed during the 2013 Remediation Program.

A total of 96 soil samples were collected from the lagoon excavation: 25 interim soil samples and 71 confirmatory soil samples.

Petroleum hydrocarbon (PHC) affected soil resulting from previous operations was effectively removed from the lagoon area during the 2013 Remediation Program based on laboratory analytical data. Approximately 1,900 m^3 of excavated soil was barged to Hay River and hauled to and disposed

at the Tervita Rainbow Lake Landfill in Rainbow Lake, AB. The last load of the barged impacted soil arrived at the landfill on October 16, 2013. Approximately 100 m^3 remained on-site in a secured metal shed, to be barged to the landfill during 2014 decommissioning activities (IEG 2014).

IEG also submitted an updated Closure and Reclamation Plan that described the activities conducted at the Site between 2011 and 2013 (IEG 2013b).

I-1.8 2014

Decommissioning activities occurred from August 6, 2014 to September 18, 2014. During the 2014 Decommissioning Program, infrastructure was decommissioned and removed along with miscellaneous materials on-site, minor investigative soil sampling was conducted, and waste remaining from the 2013 Remediation Program was packaged and removed.

Shed #2, Shed #3, and the camp building were disassembled. Materials that could be recycled such as metals were separated from the debris and waste material, for shipment to appropriate facilities. Other materials stored on-site including rig mats, piping, hoses, wooden crates, and miscellaneous parts were also removed. Materials removed were transported off-site via barge.

Approximately 18 m^3 of remaining waste soil from the 2013 remediation program was packed into soil bags and wooden crates provided by Tervita. Each soil bag and wooden crate contained approximately 1 m^3 of impacted soil.

On August 14, 2014, two composite soil samples were collected from the dirt floor of Shed #1 to assess for contaminants. The dirt floor of Shed #1 was compacted and the sampling device could only penetrate to a depth of approximately 0.1 m bgs. Measured concentrations of EC, SAR, sodium, and chloride were reported above background conditions in the two composite soil samples collected. The concentration of total barium and PHC parameter F3 exceeded the applicable guidelines in both composite samples. The concentration of PHC parameter F2 exceeded the applicable guideline in one composite sample (IEG 2015).

I-1.9 2015

Site activities conducted in 2015 included removal of the tank farm, identification and removal of buried material, and assessment of subsurface conditions. The conclusions and key findings of the Site activities were as follows:

- The tank farm was decommissioned and removed during August 2015. Metal from the tank farm was compressed and packaged for removal via barge.
- The EM (electromagnetic) survey identified 15 subsurface anomalies which were investigated. Uncovered debris was removed. Two areas of elevated conductivity were identified on the northern half of the Site and to the west of the former tank farm, respectively.
- IEG Site assessment activities included installation of 124 boreholes and collection of groundwater samples from the existing piezometers on-site.

- Background soil and groundwater guidelines were established for the Site. Reported parameter concentrations for background soil samples were below the method detection limit and/or Government of Northwest Territories (GNWT) guideline for each parameter analyzed in 2015.
- pH values were reported below the guideline range in 56 samples collected from various locations across the extent of the Site. pH values reported for background samples were within the guideline range.
- Electrical conductivity (EC) values above the GNWT guideline were observed in three samples collected from one borehole at the airstrip. Remaining analyzed samples had reported EC values below the GNWT guideline.
- Total barium concentrations were reported above the Alberta Environment (AENV) guideline in three samples collected from one borehole in the burn pit area, one borehole inside shed #1, and one borehole in the laydown/storage area.
- Concentrations of benzene exceeded the GNWT guideline in eight soil samples collected from eight boreholes in the tank farm area.
- Concentrations of toluene exceeded the GNWT guideline in 65 soil samples collected from three boreholes in the Shed #1 area, 29 boreholes in the tank farm area, three boreholes at the airstrip, 16 boreholes in the laydown/storage area, and one borehole in the camp area.
- Concentrations of ethylbenzene exceeded the GNWT guideline in nine samples collected from two boreholes in the burn pit area, one borehole in the laydown/storage area, and five boreholes in the tank farm area.
- Concentrations of xylenes exceeded the GNWT guideline in 28 samples collected from three boreholes in the laydown/storage area, four boreholes in the burn pit area, and 13 boreholes in the tank farm area.
- Concentrations of PHC fraction F1 exceeded the GNWT guideline in 16 samples collected from one borehole in the laydown/storage area, two boreholes in the burn pit area, and eight boreholes in the tank farm area.
- Concentrations of PHC fraction F2 exceeded the GNWT guideline in 44 samples collected from three boreholes in the Shed #1 area, seven boreholes in the laydown/storage area, four boreholes in the burn pit area, and 18 boreholes in the tank farm area.
- Concentrations of PHC fraction F3 exceeded the GNWT guideline in 83 samples collected from four boreholes in the shed #1 area, five boreholes at the airstrip, 23 boreholes in the laydown/storage area, two boreholes in the camp area, four boreholes in the burn pit area, 30 boreholes in the tank farm area, and two boreholes in the tundra area.
- Concentrations of PHC fraction F4 exceeded the GNWT guideline in one sample collected from the burn pit area.
- Groundwater samples collected from two piezometers contained concentrations of total dissolved solids (TDS) that exceeded the GNWT guidelines. Groundwater samples collected

from four piezometers contained concentrations of aluminum, cadmium, copper, iron, and selenium that exceeded the GNWT guidelines. One groundwater sample contained concentrations of naphthalene that exceeded the GNWT guideline (IEG 2016a).

IEG also submitted an updated Closure and Reclamation Plan that described the activities conducted at the Site between 2013 and 2015 (IEG 2016b).

I-1.10 2016

The 2016 remediation program entailed the excavation, treatment, risk-based assessment, and backfilling of the impacted soil on-site. The conclusions and key findings of the 2016 remediation program were as follows:

- Soil was excavated from seven excavation zones (2, 3, 4, 10, 11, 13, and 14) and stockpiled on-site from July 13 to August 9, 2016. Excavated soil was placed into windrows established on the undisturbed area of the Site and treated with an Allu bucket.
- Treated soil was used to backfill successfully remediated zones (2 and 11). Due to the lack of sufficient treated soil, excavation zones (3 and 4) and portions of excavation zones (10, 13, and 14) meeting GNWT guidelines or risk-based criteria were backfilled with untreated soil, which will require re-excavation and further treatment.
- A total of approximately 24,000 m^3 of soil was excavated from seven excavation zones. Approximately 10,000 m^3 was successfully treated on-site and used to fully backfill two excavation zones (2 and 11). Approximately 14,000 m^3 of soil did not meet the GNWT guidelines following soil treatment activities and was used to fully or partially backfill five excavation zones (3, 4, 10, 13, and 14).
- Approximately 200 m^3 of soil was determined to be unsuitable for on-site treatment and was packaged into 1 m^3 soil bags for transport off-site via barge to an appropriate disposal facility.

APPENDIX II

WorleyParsons Polyurethane Foam Assessment

APPENDIX 4: POTENTIAL BY-PRODUCTS OF INSULATION DEGRADATION

Introduction

A meeting was held on April 30th, 2009 to discuss the Interim Abandonment and Reclamation Plan for Camp Farewell (WorleyParsons 2006) and specifically the dismantling and remediation activities that were planned for 2009. As a result of that meeting a commitment was made to include degradation products of the foam insulation in future groundwater monitoring programs. Given that there are no historical environmental issues associated with the degradation of foam insulation, monitoring of groundwater is considered an appropriate safeguard for this possibility.

The underlying text identifies the potential by-products of the degradation of the foam insulation.

Foam Insulation Degradation Products

Assessment

Polyurethanes (PU) are typically produced by reacting diisocyanates with polyols. The two diisocyantes predominantly used in the manufacture of polyurethanes are methylenediphenyl diisocyanate (MDI) and toluene diisocyanate (TDI) (Allport 2003).

Degradation of PU foam under buried conditions is very slow and short term studies have found no change in PU foams tested at a disposal site and evaluated after 3 and 5 years, with no detectable alteration in leachate water composition. The rate at which degradation occurs is to a large extent dependent on the chemical base of the foam in question. Studies designed to evaluate the degradation of soft PU foams with a polyester versus polyether base have shown that polyurethane-ester foams are susceptible to chemical or microbial degradation, whereas polyurethane-ether foams are more resistant (IPCS 1987).

Filip (1978) observed that the microbial decomposition of polyurethane followed the following sequence: degradation of free isocyanate groups -> splitting of the urea and amide groups -> breaking off the urethane groups -> cleavage of the rings of the isocyanuric acid units.

Possible products of PU foam degradation in a buried state may include aromatic amines, produced when isocyanates are released from the PU foam. There is evidence that isocyanates used in the production of polyurethane foam can be released into the media (Filip 1979). Isocyanates are highly reactive in water and undergo rapid hydrolysis; toluene diisocyanate has a half life of 0.5 seconds to 3 days dependent on pH and turbidity (IPCS). Hydrolysis of diisocyanates forms amines; these amines then react further with excess isocyanate to create solid, insoluble polyurea (WHO 2000). Both these reactions are rapid.

A 700 day simulated landfill study assaying for aromatic amines using a variety of PU foams (including TDI-based flexible foams and MDI-based rigid foams) did not see the expected aromatic amines released into leachate. It was unclear as to whether the aromatic amines were becoming bound to the substrate, or metabolized (Brown cited by DeGaspari 1999).

According to the work of Filip (1978), cleavage of isocyanuric acid rings is the final stage in the microbial decomposition. Isocyanuric acid (also known as cyanuric acid) is stable in water and not readily biodegradable (OECD 1999). Once dissolved into water, cyanuric acid is not likely to volatilize or to be adsorbed by soil particles (OECD 1999). It is possible to detect and measure isocyanuric acid in water samples using a melamine solution and turbidity test.

Proposed Monitoring

Based on the above, it is evident that polyurethane foam is not susceptible to degradation and that potential degradation products are not particularly soluble. That said, potential degradation products contain significant proportions of nitrogen. Accordingly, it is proposed to include total nitrogen (as well as nitrate and nitrite) in the routine groundwater monitoring program for the site. If anomalous nitrogen concentrations are noted, then target analysis for cyanuric acid would be completed. It is also recommended that at least one round of groundwater testing include specific analysis of cyanuric acid.

References

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IPCS (International Programme on Chemical Safety). 1987. Environmental Health Criteria 75: Toluene Diisocyanates Available online: http://www.inchem.org/documents/ehc/ehc/ehc75.htm

OCED (Organisation for Economic Co-operation and Development). 1999. Screening Information Data Set (SIDS) for Isocyanuric Acid, CAS N°: 108-80-5. UNEP Publications. Available at: http://www.inchem.org/documents/sids/sids/108805.pdf

WHO (World Health Organization). 2000. Concise International Chemical Assessment Document 27 Diphenylmethane Diisocyanate (MDI). Geneva 2000. Available at: http://www.who.int/ipcs/publications/cicad/en/cicad27.pdf

WorleyParsons Komex, 2006. 2006 Environmental Site Assessment, Camp Farewell, NT. Unpublished report prepared for Shell Canada Limited, December 2006. C52360300.

APPENDIX III

Permits and Licenses

INUVIALUIT SIVUNNIUQPAIT IMAKKUN

INUVIALUIT WATER BOARD

July 13, 2017

David A. Brown
Staff Environmental Engineer
Shell Canada Energy
150 N. Dairy Ashford Road
Houston, Texas 77079

Dear Mr. Brown:

Re: N7L1-1834 – Shell Canada Energy, Camp Farewell – Term Amendment of Type "B" Water Licence

The Inuvialuit Water Board (IWB) is pleased to approve a term amendment of Water Licence N7L1-1834 for closure and remediation and post monitoring activities. In this regard, all terms and conditions for N7L1-1834 will remain as originally issued with the exception of:

1. the extension of the expiry date to July 17, 2029;
2. Part B: General Conditions, Item 12; and
3. Part D: Conditions Applying to Waste Disposal, Item 16.

Each of these are detailed in the attached licence amendment.

A copy of the amended Terms and Conditions and all documentation associated with the term amendment of the licence has been filed in the Public Register. Copies are available at the IWB office and on the IWB Electronic Register located on the IWB website: www.inuvwb.ca.

The IWB appreciates the cooperation of Shell Canada Energy in complying with the Terms and Conditions of the Water Licence. Should you have any questions or concerns, please contact Mardy Semmler, Executive Director, at (867) 678-2942.

Sincerely,

Roger Connelly
Chairperson

Attachments

Copied to: Lloyd Gruben, ENR Water Resources Officer - Inuvik Region

INUVIALUIT SIVUNNIUQPAIT IMAKKUN

INUVIALUIT WATER BOARD

INUVIALUIT WATER BOARD
LICENCE AMENDMENT

Licensee	Shell Canada Energy
Licence Number	N7L1-1834
Effective Date of Amendment	July 18, 2017

Pursuant to the *Waters Act* and Waters Regulations the Inuvialuit Water Board hereby grants the following Licence Amendment.

Term of Water Licence

The current expiry date has been extended to July 17, 2029 to ensure consistency with the Closure and Reclamation Plan that includes an eight (8) year monitoring, maintenance, and reporting program following the completion of the permanent closure activities.

Part B: General Conditions

12. Consultation records, including a summary, with the Hunters and Trappers Committee (HTC) of Tuktoyaktuk must be submitted to the IWB at least thirty (30) days prior to conducting any activities at the site.

Part D: Conditions Applying to Waste Disposal

16. A barge waste management and disposal plan must be submitted to the IWB at least thirty (30) days prior to mobilization of the barge to the site.

This Licence is amended and recorded at Inuvik, Northwest Territories.

INUVIALUIT WATER BOARD

Chairperson

July 13, 2017
Date

PART A: SCOPE AND DEFINITIONS

1. Scope

a) This Licence entitles Shell Canada Energy to use water and dispose of Waste as an industrial undertaking associated with oil and gas exploration and development in the Mackenzie Delta at Farewell Camp and Stockpile Site (Camp Farewell) located at Latitude 69°12'30" North, and Longitude 135°06'04" West, Northwest Territories;

b) This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of Waste of any type in any Waters or in any place under any conditions where such Waste or any other Waste that results from the deposits of such Waste may enter any Waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Northwest Territories Waters Act*, or other statutes imposing more stringent conditions relating to the quantity or type of Waste that may be so deposited or under which any such Waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conforming to such Regulations; and

c) Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

d) This Licence is issued subject to the conditions contained herein with respect to the use of Waters as prescribed in Section 8 of the *Act* and the deposit of Waste to any Waters as prescribed in Section 9 of the *Act*.

2. Definitions

In this Licence: **N7L1-1834**

"Act" means the *Northwest Territories Waters Act*;

"Analyst" means an Analyst designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"**Average Concentration**" means the discrete average of up to four (4) consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"**Board**" means the Northwest Territories Water Board established under Section 10 of the *Northwest Territories Waters Act*;

"**Freeboard**" means the vertical distance between water line and the lowest elevation of the effective water containment crest on a dam or dyke's upstream slope;

"**Geotechnical Engineer**" means a professional engineer registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists whose principal field of specialization is the design and construction of earthworks in a permafrost environment;

"**Greywater**" means all liquid Wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet Waste;

"**Inspector**" means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"**Licensee**" means the holder of this Licence;

"**Minister**" means the Minister of Aboriginal Affairs and Northern Development Canada (AANDC);

"**Modification**" means an alteration to a physical work that introduces a new structure or replaces an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Regulations**" mean Regulations proclaimed pursuant to Section 33 of the *Northwest Territories Waters Act;*

"**Sewage**" means all toilet Wastes and Greywater;

"**Sewage Treatment Facilities**" comprises the area and engineered structures designed to contain Sewage as identified in the project description and also include a Sump constructed of impervious material and/or with an impervious liner;

"**Sump**" means an excavation for the purpose of catching or storing water and/or Waste;

"**Waste**" means Waste as defined by Section 2 of the *Northwest Territories Waters Act*;

"Waste Disposal Facilities" mean all facilities designated for the disposal of Waste and include the Sewage disposal facilities, solid Waste disposal facilities, and bagged toilet Wastes disposal facilities;

"Water Supply Facilities" mean all facilities designed to collect, treat and supply water for industrial purposes; and

"Waters" mean Waters as defined by Section 2 of the *Northwest Territories Waters Act*;

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board not later than March 31st of the year following the calendar year reported which shall contain the following information:

    a) the monthly and annual quantities in cubic metres of fresh water obtained from all sources;

    b) the monthly and annual quantities in cubic metres of each and all Waste discharged;

    c) the location and direction of flow of all Waste discharged to the water or the land;

    d) a summary of the monthly and annual quantities of Waste stored on site and transported off site;

    e) the results of sampling carried out under the "Surveillance Network Program";

    f) a summary of any Modifications carried out on the Water Supply Facilities and Sewage Treatment Facilities, including all associated structures;

    g) a list of any spills and unauthorized discharges;

    h) details on the restoration of any Sumps;

    i) a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;

j) a summary of any studies requested by the Board that relate to Waste disposal, water use, or reclamation, and a brief description of any future studies planned;

k) notation of updates and/or revisions to the approved Spill Contingency Plan, Waste Disposal Facilities operations and maintenance plan, and sewage treatment plan;

l) an outline of any spill training and communications exercises carried out; and

m) any other details on water use or Waste disposal requested by the Board within forty-five (45) days before the annual report is due.

2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.

3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

4. The Licensee shall, within thirty (30) days of the issuance of this Licence, submit to the Board for approval a map or drawing indicating the location of all Surveillance Network Program sampling stations.

5. The Licensee shall, within thirty (30) days of the issuance of this Licence, post the necessary signs to identify the stations of the "Surveillance Network Program". All postings shall be located and maintained to the satisfaction of an Inspector.

6. Any meters, devices or other such methods used for measuring the volumes of water used or Waste disposed and discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

7. The Licensee shall immediately report to the 24 Hour Spill Report Line (**867-920-8130**) any spills which are reported to, or observed by, the Licensee within the project boundaries.

8. All monitoring data shall be submitted in printed form and electronically in spreadsheet format on a diskette or other electronic forms acceptable to the Board.

9. All reports shall be submitted to the Board in printed format accompanied by an electronic copy in a common word processing format on diskette or other electronic forms acceptable to the Board.

10. Within thirty (30) days of issuance of this Licence, the Licensee shall have posted and shall maintain a security deposit in the amount of Two Million ($2,000,000.00) Dollars pursuant to Section 17 of the *Act* and Section 12 of the Regulations, in a form suitable to the Minister. The security deposit shall be maintained until such time as it is fully or in part refunded by the Minister pursuant to Section 17 of the *Act*.

11. The Licensee shall ensure a copy of this Licence is maintained at the site of operation at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain water from the Middle Channel of the Mackenzie River in winter or the unnamed lake north of the camp in summer as described in the project description, or as otherwise approved by an Inspector.

2. The daily quantity of water used for all purposes shall not exceed 150 cubic metres.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall within thirty (30) days of the issuance of this Licence, submit to the Board for approval an updated operation and maintenance plan for the Waste Disposal Facilities. This plan shall include but not necessarily be limited to details on the design, operational capacity, management and maintenance, and disposal of sludges.

2. All Sewage shall be directed to the onsite Sewage Treatment Facilities as approved by an Inspector.

3. The Sewage Treatment Facilities shall be maintained and operated in such a manner as to prevent structural failure to the satisfaction of the Inspector.

4. All Waste discharged from the onsite Sewage lagoon shall be directed to the channel of the Mackenzie River at a location approved by an Inspector.

5. There should be no discharge of floating solids, garbage, grease, free oil or foam.

6. All effluent discharged by the Licensee from the Sewage lagoon at "Surveillance Network Program" Station Number 1834-1 shall meet the following effluent quality requirements:

Sample Parameter	Average Concentration
BOD_5	70.0 mg/L
Total Suspended Solids	70.0 mg/L
Faecal Coliforms	1 X 10^4 CFU/dL
Oil and Grease	5.0 mg/L
Total Residual Chlorine (TRC)	0.1 mg/L

7. The effluent discharged shall have a pH between six (6) and nine (9) and no visible sheen of oil and grease.

8. Introduction of water to Waste for the purpose of achieving effluent quality requirements in Part D, Item 7 is prohibited.

9. A Freeboard limit of 1.0 metre shall be maintained at all times in the Sewage lagoon, or as recommended by a qualified Geotechnical Engineer and/or as approved by the Board.

10. The Licensee shall advise an Inspector at least five (5) days prior to initiating and decant of the Sewage lagoon.

11. All analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of water and Wastewater" or by such other methods as may be approved by an Analyst.

12. The Licensee shall contain all contaminated soil or contaminated snow in such a manner as to minimize the potential for migration of contaminants into any Waters, to the satisfaction of an Inspector.

13. The Licensee shall store, segregate and dispose of all solid and hazardous Wastes in a manner acceptable to the Inspector.

14. Unless authorized by this Licence, the Licensee shall ensure that any Wastes associated with this undertaking do not enter any water body.

15. The Licensee shall submit to the Board a copy of each agreement(s) between third parties to store, transport or dispose of Wastes. The copy submitted to the Board shall include, at a minimum, the following:

a. type of Waste;

b. quantities of Waste;

c. disposal location(s), and

d. proof of acceptance from third parties.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out Modifications to the planned undertakings provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

    a) the Licensee has notified an Inspector in writing of such proposed Modifications at least five (5) days prior to beginning the Modifications;

    b) such Modifications do not place the Licensee in contravention of either the Licence or the *Act*;

    c) an Inspector has not, during the five (5) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than five (5) days; and

    d) an Inspector has not rejected the proposed Modifications.

2. Modifications for which all of the conditions referred to in Part F, Item 1 have not been met may be carried out only with written approval from an Inspector.

3. The Licensee shall provide to the Board as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modifications.

PART F: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. The Licensee shall submit to the Board for approval within thirty (30) days of issuance of this Licence an updated Emergency Response & Spill Contingency Plan in accordance, for example, with the *Guidelines for Spill Contingency Planning, April 2007,* developed by AANDC-Water Resources Division.

2. The Licensee will maintain a copy of the approved Emergency Response & Spill Contingency Plan onsite in a readily available location, to the satisfaction of an Inspector.

3. The Licensee shall ensure that petroleum products, hazardous material and other Wastes associated with the project do not enter any Waters.

4. The Licensee shall ensure that all containment berms are constructed of an impermeable material, to the satisfaction of an Inspector.

5. The Licensee shall ensure that fuel stored in each tank within the tank farm be no greater than 85% of the tank's capacity to allow for expansion and avoid overflows.

6. If, during the period of this Licence, an unauthorised discharge of Waste occurs, or if such a discharge is foreseeable, the Licensee shall:

    a) report the incident immediately via the 24 Hour Spill Reporting Line (867) 920-8130; and

    b) submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval within one (1) year of issuance of this Licence, an updated Interim Abandonment and Restoration Plan including plans for the abandonment and restoration of the Sewage lagoon and a complete Phase II environmental site assessment of Camp Farewell. This assessment will include the full delineation of contamination (soil and water) associated with Camp Farewell operations, located both on and off the gravel base pad.

2. The Licensee shall implement this Plan as and when approved by the Board.

3. Following approval of the Plan, the Licensee shall review the Abandonment and Restoration Plan every two (2) years and shall modify the Plan as necessary to reflect changes in operations and technology. All proposed Modifications to the Plan shall be submitted to the Board for approval.

NORTHWEST TERRITORIES WATER BOARD

Chairman

Witness

CAMP FAREWELL

Environment and Climate Change Canada | Environnement et Changement Climatique Canada

ENVIRONMENT AND CLIMATE CHANGE CANADA
PERMIT

Migratory Birds - Sanctuary	**NWT-MBS-18-03**
Permit for	Permit no.
Northwest Territories	**9.**
province(s), territories	Issued under section
	Migratory Bird Sanctuary Regulations

Lorenzo Fontana
PO Box 100 Station M
400 4th Ave SW
Calgary, AB, T2P 2H5

Permittee

For the minister

Date of issue : **June 28 2018**

Date of expire: **December 31 2018**

Period of validity: **June 28- October 01**

The Permittee is authorized to enter the following Migratory Bird Sanctuary:

- Kendall Island Migratory Bird Sanctuary

The permittee is authorized to conduct the following activities within the Migratory Bird Sanctuary:

- The Permittee shall not conduct any activities in the Kendall Island MBS outside the Camp Farewell lease area.
- Excavation, till/windrow, and on-site treatment of impacted soil, disposal of waste materials uncovered during excavation activities, package, transportion, and disposal of soil that cannot be treated on-site, and backfill excavated areas with treated soil that meets applicable remediation guidelines
- Collect soil samples
- Transport project equipment and personnel via barge and boat.
- Establish a camp confined to a barge (i.e., no land camping). All waste materials generated by the camp must be stored aboard the barge for proper disposal outside the MBS.
- Use of motorized land and water vehicles (no aircraft) for soil remediation purposes.

Canada

GENERAL CONDITIONS

1. This permit is valid only if it is signed by the permit holder (permittee)
2. By signing this document you bind yourself to respect all terms and conditions of this permit.
3. This permit is non-transferable and is not valid if altered, other than by the Minister, in any way.
4. The permit holder is responsible for ensuring that all nominees comply with the permit terms and conditions and requirements.
5. The permit holder is responsible for informing the CWS regional office immediately of any changes to nominees or project activities authorized in the permit, and if necessary, applying for a new or amended permit to conduct the new activities.
6. The Permittee must comply with all other applicable Federal, Territorial, Indigenous and Municipal laws, bylaws and regulations.
7. The permit holder and nominees must carry a signed copy of the permit on their person when conducting the activities authorized by the permit. A copy of the permit must be shown to any Game Officer, or other authorized officer, forthwith upon request.
8. The Permittee shall display a copy of this permit in a conspicuous place in any campsite established to carry out this program.
9. Additional restrictions may be required and may be added to this permit by the Minister if it is deemed necessary to ensure compliance with the Migratory Birds Convention Act and the Regulations.
10. The Permittee is authorized to possess firearms in the Migratory Bird Sanctuary for protection from dangerous wildlife only. All ammunition used must be non-toxic.
11. This permit may be revoked at any time at the discretion of the Minister.
12. The permit holder must submit an annual report in the proper form by December 31 of each year that the permit is valid.

SPECIAL CONDITIONS

1. OPERATIONS – PROTECTION OF HABITAT

1. The Permittee shall not operate within the Migratory Bird Sanctuary any motorized vehicles, unless otherwise indicated on this permit.
2. The Permittee shall not move any equipment or vehicles unless the ground is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.
3. The Permittee shall not remove or relocate earth, unless otherwise authorized on this permit.
4. The Permittee shall not establish any camps or store equipment or supplies not specifically authorized on this permit.
5. The Permittee shall not place dirt or debris into streams to serve as ramps for loading or unloading watercraft.
6. The Permittee shall not cut any bank of a waterbody.

Canada

2. OPERATIONS – WILDLIFE DISTURBANCE AND INTERACTION

1. The Permittee shall not feed wildlife or attempt to attract wildlife.

2. The permittee shall not harass wildlife. This includes persistently circling, chasing, hovering over, pursuing or in any other way harassing wildlife, or disturbing large groups of animals.

3. All vessels (except small launch vessels) must maintain a minimum distance of 500 m from seabird colonies and concentrations of coastal waterfowl and seaducks. Only approach seabird colonies/concentration of waterfowl as close as 100 m in small launch vessels (e.g., zodiacs, kayaks, canoes).

3. FUEL STORAGE AND HANDLING

1. The Permittee shall not allow oil, oil wastes or any other substance harmful to migratory birds to be deposited in waters or other areas frequented by migratory birds, or in a place from which the substances may enter waters frequented by migratory birds.

2. The Permittee shall report the location and quantity of all authorized caches of fuel and other substances to the Manager within ten days after the cache is established. A fuel spill kit that contains appropriate fuel-spill absorbent materials must be available for each cache.

3. All fuel containers with a capacity of 205 - 2500 l. must have secondary containment with a holding capacity of 110% of the largest volume of fuel to be stored at the site, unless otherwise authorized on this permit.

4. Secondary fuel containment shall consist of a barrier such as neoprene with clay liner, or a steel or concrete berm, or similar apparatus approved by the Minister.

5. The Permittee shall not place any petroleum fuel storage containers in such a manner that it may enter any waterbody.

6. The Permittee shall examine all fuel storage containers for leaks a minimum of once every day when on site and repair all leaks immediately.

7. The Permittee shall permanently mark all fuel containers, including 205 L drums, with the Permittee's name.

8. All leaks and spills of fuel or hazardous material shall be cleaned up immediately. The Permittee shall keep a log of all spills. The log should include amount of spill, specific location including GPS coordinates, and clean-up undertaken. The spill log shall be submitted in the Annual Report.

9. The Permittee shall report all spills to the Nunavut/Northwest Territories 24-hr Spill Report Line (867-920-8130).

10. Any spill area shall be restored as soon as possible to the satisfaction of the Minister.

4. GARBAGE, HAZARDOUS WASTE, AND WASTE WATER HANDLING AND REMOVAL

1. The Permittee shall ensure that all domestic garbage and other wildlife attractants are inaccessible to wildlife at all times.
2. The Permittee shall regularly collect all waste, debris and domestic garbage and dispose of it using appropriate technology and accepted practices.
3. The Permittee shall inventory and dispose of any waste materials, construction materials, drilling materials or other materials on at least an annual basis to minimize accumulation within the permit area. The inventory of materials disposed and materials remaining within the permit area must be reported to the Manager.
4. All access must be "no trace" and all garbage and debris must be removed from the Sanctuary.
5. The Permittee shall have the appropriate Workplace Hazardous Material Information System, 'Material Safety Data Sheets' identification available on site.
6. The Permittee shall remove and dispose of all hazardous materials at an approved facility.
7. The Permittee shall conduct maintenance, oil changes, refueling and lubricating of mobile equipment no closer than 100 m from waterbodies (lakes, ponds, and streams).

5. CLEAN-UP AND RESTORATION

1. Regardless of the expiry date of the permit, the Permittee will be responsible for the cost of the clean up or restoration of habitat.
2. The Permittee shall restore the surface of all altered habitat to a condition as close as possible to its natural state and to the satisfaction of the Minister, in writing
3. The Permittee shall be responsible for the full cost of remediation of all altered habitat to its natural state and to the satisfaction of the Minister, in writing

6. REPORTING

1. The Permittee shall submit a detailed annual permit report in the proper form (see Canadian Wildlife Service - Northern Region Guidelines for Annual Permit Reports for National Wildlife Area and Migratory Bird Sanctuary Permits) to the Canadian Wildlife Service by December 31 of each year that the permit is valid. Please contact the Regional CWS office for more information.

7. NOTIFICATION OF ENTRY

1. The permittee shall notify the Canadian Wildlife Service and Wildlife Enforcement Division 72 hours prior to entering the Migratory Bird Sanctuary at **ec.dalfnord-wednorth.ec@canada.ca**.

DEFINITIONS

Manager: Manager, Northern Region, Canadian Wildlife Service, Environment Canada or his/her designate.

Minister: The Minister of the Environment.

Permittee: The party to whom a CWS Sanctuary Permit is issued for conducting activities in a migratory bird sanctuary.

Waterbody: Any river, stream, creek, lake, or pond.

Camp: A collection of accommodations, maintenance, transportation, and storage facilities located either permanently or temporarily at a site.

Nominee(s): Grahame Bensted, David Brown, Rob Gray, Kris Zurkan, Nicole Wills, contractors of Shell Canada Energy

I declare that I have read and understand this Permit, including all the conditions attached.

Signature of Permittee

JULY 11, 2018

Date

APPENDIX IV

Water Licence N7L1-1834 Reporting Requirements

Appendix IV
Water Licence N7L1-1834 Reporting Requirements

IV-1 CONCORDANCE TABLE

Conditions in Part B through D of Water Licence N7L1-1834, along with the appropriate report section in which they are addressed, are summarized in the concordance table below (Table 1).

Table IV-1 Water Licence N7L1-1834 Concordance Table

No.	Description	Reference Section in Report	Additional Comments
B	GENERAL CONDITIONS		
1.	The Licensee shall file an Annual Report with the Board not later than March 31st of the year following the calendar year reported which shall contain the following information: (See Section IV-2)	Appendix IV, Section IV-2	
2.	The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.	Not applicable	Sewage lagoon has been decommissioned and remediated.
3.	The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.	Not applicable	Sewage lagoon has been decommissioned and remediated.
4.	The Licensee shall, within thirty (30) days of the issuance of this Licence, submit to the Board for approval a map or drawing indicating the location of all Surveillance Network Program sampling stations.	Not applicable	Sewage lagoon has been decommissioned and remediated.
5.	The Licensee shall, within thirty (30) days of the issuance of this Licence, post the necessary signs to identify the stations of the "Surveillance Network Program". All posting shall be located and maintained to the satisfaction of an Inspector.	Not applicable	Sewage lagoon has been decommissioned and remediated.
6.	Amy meters, devices or other such methods used for measuring the volumes of water used or Waste disposed and discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.	Not applicable	Sewage lagoon has been decommissioned and remediated.
7.	The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills which are reported to, or observed by, the Licensee within the project boundaries.	Appendix IV, Section IV-2, g)	Sewage lagoon has been decommissioned and remediated.
8.	All monitoring data shall be submitted in printed form and electronically in a spreadsheet format on a diskette or other electronic forms acceptable to the Board.	Not applicable	Sewage lagoon has been decommissioned and remediated.
9.	All reports shall be submitted to the Board in printed format accompanied by an electronic copy in a common word processing format on diskette or other electronic forms acceptable to the Board.	Camp Farewell Remediation Program, Annual Report 2018	Report has been submitted in printed and electronic formats.
10.	Within thirty (30) days of issuance of this Licence, the Licensee shall have posted and shall maintain a security deposit in the amount of Two Million ($2,000,000.00) Dollars pursuant to	Not applicable.	Security deposit was posted at time of Licence renewal.

No.	Description	Reference Section in Report	Additional Comments
	Section 17 of the *Act* and Section 12 of the Regulations, in a form suitable to the Minister. The security deposit shall be maintained until such time as it is fully or in part refunded by the Minister pursuant to Section 17 of the *Act*.		
11.	The Licensee shall ensure a copy of this Licence is maintained at the site of operation at all times.	Not applicable.	Licence was posted at barge camp for duration of 2018 Remediation Program.
12.	Consultation records, including a summary, with the Hunters and Trappers Committee (HTC) of Tuktoyaktuk must be submitted to the IWB at least thirty (30) days prior to conducting any activities at the site.	Not applicable	Consultation records were included in Project Description, submitted under separate cover.
C	CONDITIONS APPLYING TO WATER USE		
1.	The Licensee shall obtain water from the Middle Channel of the Mackenzie River in winter or the unnamed lake north of the camp in summer as described in the project description, or as otherwise approved by an Inspector.	Appendix IV, Section IV-2, a)	Water for daily operation of the camp barge was obtained from a spacer barge and from Middle Channel.
2.	The daily quantity of water used for all purposes shall not exceed 150 cubic metres.	Appendix IV, Section IV-2, a)	Quantity of water obtained did not exceed this limit.
D	CONDITIONS APPLYING TO WASTE DISPOSAL		
1.	The Licensee shall within thirty (30) days of the issuance of this Licence, submit to the Board for approval an updated operation and maintenance plan for the Waste Disposal Facilities. This plan shall include but not necessarily be limited to details on the design, operational capacity, management and maintenance, and disposal of sludges.	Not applicable	Sewage lagoon has been decommissioned and remediated.
2.	All sewage shall be directed to the onsite Sewage Treatment Facilities as approved by an Inspector.	Not applicable	Sewage lagoon has been decommissioned and remediated.
3.	The Sewage Treatment Facilities shall be maintained and operated in such a manner as to prevent structural failure to the satisfaction of the Inspector.	Not applicable	Sewage lagoon has been decommissioned and remediated.
4.	All Waste discharged from the onsite Sewage lagoon shall be directed to the channel of the Mackenzie River at a location approved by an Inspector.	Not applicable	Sewage lagoon has been decommissioned and remediated.
5.	There should be no discharge of floating solids, garbage, grease, free oil or foam.	Not applicable	Sewage lagoon has been decommissioned and remediated.
6.	All effluent discharged by the Licensee from the Sewage lagoon at “Surveillance Network Program” Station Number 1834-1 shall meet the following effluent quality requirements: **Sample Parameter** — **Average Concentration** BOD_5 — 70.0 mg/L Total Suspended Solids — 70.0 mg/L	Not applicable	Sewage lagoon has been decommissioned and remediated.

No.	Description	Reference Section in Report	Additional Comments
	Faecal Coliforms 1 X 10^4 CFU/dL Oil and Grease 5.0 mg/L Total Residual Chlorine (TRC) 0.1 mg/L		
7.	The effluent discharged shall have a pH between six (6) and nine (9) and no visible sheen of oil and grease.	Not applicable	Sewage lagoon has been decommissioned and remediated.
8.	Introduction of water to Waste for the purpose of achieving effluent quality requirements in Part D, Item 7 is prohibited.	Not applicable	Sewage lagoon has been decommissioned and remediated.
9.	A Freeboard limit of 1.0 metre shall be maintained at all times in the Sewage lagoon, or as recommended by a qualified Geotechnical Engineer and/or as approved by the Board.	Not applicable	Sewage lagoon has been decommissioned and remediated.
10.	The Licensee shall advise an Inspector at least five (5) days prior to initiating and decant of the Sewage lagoon.	Not applicable	Sewage lagoon has been decommissioned and remediated.
11.	All analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of water and Wastewater" or by such other methods as may be approved by an Analyst.	Not applicable	Sewage lagoon has been decommissioned and remediated.
12.	The Licensee shall contain all contaminated soil or contaminated snow in such a manner as to minimize the potential for migration of contaminants into any Waters, to the satisfaction of an Inspector.	Section 4.5	Contaminated soil backfilled into excavations at end of 2018 Remediation Program. Site inspected by GNWT Inspector prior to demobilization.
13.	The Licensee shall store, segregate and dispose of all solid and hazardous Wastes in a manner acceptable to the Inspector.	Appendix IV, Section IV-2, b)	Solid waste was contained in garbage bins on the barge and returned to Inuvik for disposal at the Inuvik Solid Waste Disposal Facility
14.	Unless authorized by this Licence, the Licensee shall ensure that any Wastes associated with this undertaking do not enter any water body.	Not applicable	No Wastes entered a water body during the 2018 Remediation Program.
15.	The Licensee shall submit to the Board a copy of each agreement(s) between third parties to store, transport or dispose of Wastes. The copy submitted to the Board shall include, at a minimum, the following: a. type of Waste; b. quantities of Waste; c. disposal location(s), and d. proof of acceptance from third parties.	Not applicable	Submitted to the Board at the time of Licence renewal.
16.	A barge waste management and disposal plan must be submitted to the IWB at least thirty (30) days prior to mobilization of the barge to the site.	Not applicable	To be submitted under separate cover.

IV-2 PART B, ITEM 1 REPORTING REQUIREMENTS

IEG is providing the following information on behalf of Shell Canada Energy as per the requirements listed in Part B, Item 1. of Water License N7L1-1834. The following responses outline water use and waste discharge during the 2018 field program, conducted between July and September 2018.

a) Monthly and annual quantities in cubic metres of fresh water obtained from all sources.

Approximately 60 m^3 of fresh water was obtained from a spacer barge and approximately 100 m^3 of fresh water was obtained from the Middle Channel of the Mackenzie River. This water was used for the daily operation of the camp barge. Fresh water was not obtained from other sources during the 2018 Remediation Program.

Part C, Item 1 of Water Licence N7L1-1834 states that "*the Licensee shall obtain water from the Middle Channel of the Mackenzie River in winter or the unnamed lake north of the camp in summer as described in the project description, or as otherwise approved by an Inspector";* however, the intake system required to obtain water from the unnamed lake was removed from the Site in 2013. Shell's intention to use the Middle Channel as a fresh water source during the 2018 Remediation Program was outlined in the 2018 Project Description.

b) Monthly and annual quantities in cubic metres of each and all Waste discharged.

Waste water generated at the barge camp was contained in a waste water holding AST and returned to Inuvik for disposal by the barge operator. Approximately 240 m^3 of waste water was generated and was disposed of at the Inuvik Sewage Lagoon.

Domestic waste was contained in garbage bins on the barge and periodically returned to Inuvik by boat for disposal. Approximately 1 m^3 of domestic waste was generated daily and was disposed of at the Inuvik Solid Waste Disposal Facility.

c) Location and direction of flow of all Waste discharged to the water or the land.

Several precipitation events (rain and snow) caused water to pond in areas of the excavation over the course of the 2018 Remediation Program. Prior to backfilling the excavation, a drainage channel was cut into the southeast corner of the lease and the ponded water was directed to the channel to discharge into an off-lease vegetated area. The water was not tested prior to release. Table IV-2 presents a summary of the water discharge event.

Table IV-2 Water Discharged Off-Site

Area	Date of Discharge	UTM (Northing/Easting)	Discharge Volume (m^3)	Direction of Discharge
Excavation	Sept 5 to ~Sept 12, 2018	7677702.27 / 496213.49	Unknown	Southwest

d) Summary of monthly and annual quantities of Waste stored on site and transported off site.

As described in the response to item b), 240 m^3 of waste water was generated at the barge camp and was contained in a waste water holding AST prior to disposal at the Inuvik Sewage

Lagoon by the barge operator. Domestic waste was contained in garbage bins on the barge and was disposed of at the Inuvik Solid Waste Disposal Facility. Approximately 1 m^3 of domestic waste was generated daily.

Approximately 348 m^3 of polyurethane foam and other nonhazardous waste materials (buried debris) were excavated from the Site in 2018. Excavated waste materials were placed into 1 m^3 soil bags and loaded into Shed #1 for winter storage. The polyurethane foam will be removed from the Site and disposed of at an appropriate facility in 2019. The other waste was separated from the polyurethane foam and will also be removed from the Site and transferred to an appropriate facility in 2019.

e) Results of sampling carried out under the "Surveillance Network Program".

The "Surveillance Network Program" applies to the sewage lagoon (Station Number 1834-1) which was remediated in 2013. Therefore, there has been no sampling carried out under the "Surveillance Network Program" since 2013. Refer to Appendix I for a summary of historical activities at the site or the annual report submitted to the IWB in 2014 entitled "*Camp Farewell Lagoon Remediation*" for additional detail.

f) Summary of any Modifications carried out on the Water Supply Facilities and Sewage Treatment Facilities, including all associated structures.

Water Supply Facilities and Sewage Treatment Facilities were removed in 2013. Refer to Appendix I for a summary of historical activities at the Site.

g) List of any spills and unauthorized discharges.

There was one unauthorized discharge of ponded runoff from the lease to an off-lease vegetated area, which is described in the response to item c).

There were no other spills or unauthorized discharges during the 2018 Remediation Program.

h) Details on the restoration of any Sumps.

There were no sumps restored during the 2018 Remediation Program.

i) Summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year.

A summary of work completed in 2018 is included in Section 4. Proposed activities for the Site in 2019 are included in Section 9.

j) Summary of any studies requested by the Board that relate to Waste disposal, water use, or reclamation, and a brief description of any future studies planned.

There have been no studies requested by the board that relate to waste disposal, water use or reclamation. There are no future studies planned at this time.

k) Notation of updates and/or revisions to the approved Spill Contingency Plan, Waste Disposal Facilities operations and maintenance plan, and sewage treatment plan.

The Waste Disposal Facilities Operations and Maintenance Plan and Sewage Treatment Plan no longer apply as there is no longer waste disposal facilities or a sewage lagoon. Shell requests that these plans be disregarded.

The prime contractor, Tervita, prepared a Site Emergency Response Plan (ERP) for the 2018 remediation program, which included the following direction regarding spill response:

- A Sea can spill kit container will be readily available on site. This kit will have all the necessary equipment and materials to handle minor spills.
- In the event of a spill of any kind, if safe to do so, the spill will be contained and/or controlled and then the area will be cordoned off, the spill will be reported to the Site Supervisor and the Environmental Monitor/Consultant before proceeding with clean up. Appropriate MSDS will be reviewed for safe and proper handling procedures.
- The spill will be handled and cleaned as necessary as well as disposal of such material spilled.

l) Outline of any spill training and communications exercises carried out.

The ERP was reviewed with all on-site personnel and posted at the camp accommodations. An overview of appropriate spill response actions and communications was reviewed at morning tailgate meeting.

m) Any other details on water use or Waste disposal requested by the Board within forty-five (45) days before the annual report is due.

At the time of reporting, the Board has not requested additional details on water use or waste disposal.

APPENDIX V

Site Photographs

Appendix V
Site Photographs

Photo 1 View of barge camp secured to bollard on shore (August 11, 2018).

Photo 2 Excavating impacted fill and polyurethane foam overlying native peat (July 27, 2018).

Photo 3 View excavated soil stockpiles being treated with Allu bucket (July 28, 2018).

Photo 4 View of polyurethane foam in soil bag (September 6, 2018).

Photo 5 View of soil bags placed in staging area facing south (September 5, 2018).

Photo 6 View of Site recontoured at end of program (September 20, 2018).

Photo 7 View of blocked approach to airstrip (September 12, 2018).

APPENDIX VI

Laboratory Data Summary Tables

Table 1: Interim and Confirmatory Soil Sample Analytical Results for Petroleum Hydrocarbons

Sample Designation	Sample Depth (m bgs)	Sample Date (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4	Total F1-F3
			ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES												
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	130	150	400	2800	-
Proposed SSRA Criteria (GPRA 2018)				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5000**
INTERIM RESULTS												
EX18-004	0.3	07/26/2018	10	<0.005	0.14	<0.01	<0.05	<10	720	680	30	-
EX18-005	0.3	07/26/2018	5	<0.005	0.11	0.01	0.17	<10	640	960	190	-
EX18-006	0.3	07/26/2018	10	<0.005	0.05	<0.01	<0.05	<10	560	960	220	-
EX18-007	0.3	07/26/2018	20	<0.005	<0.05	<0.01	<0.05	<10	500	690	120	-
EX18-008	0.3	07/26/2018	10	<0.005	0.06	0.01	0.05	<10	1410	1530	270	-
EX18-009	0.3	07/26/2018	10	<0.005	0.1	0.01	0.09	<10	1080	1220	200	-
EX18-013	0.3	07/26/2018	5	<0.005	0.11	0.02	0.08	<10	490	550	30	-
EX18-014	0.3	07/26/2018	20	<0.005	0.08	0.01	0.05	<10	430	690	110	-
EX18-015	0.3	07/26/2018	0	<0.005	0.08	0.01	0.1	10	860	1000	210	-
EX18-016	0.3	07/26/2018	25	<0.005	0.06	0.03	0.25	30	890	790	130	-
EX18-017	0.3	07/26/2018	30	<0.005	0.06	0.04	0.31	20	1210	880	110	-
EX18-018	0.3	07/26/2018	20	0.008	0.48	0.21	2.28	110	1890	1730	230	-
CONFIRMATORY RESULTS												
EX18-001	0.6	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	170	280	60	450
EX18-002	0.6	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	770	630	70	1400
EX18-003	0.6	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	60	200	60	260
EX18-010	0.6	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	490	660	130	1150
EX18-011	0.6	07/26/2018	10	<0.005	0.07	<0.01	<0.05	<10	630	700	110	1330
EX18-012	0.6	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	80	200	50	280
EX18-019	0.6	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	390	560	110	950
EX18-020	0.6	07/26/2018	10	<0.005	0.08	<0.01	<0.05	<10	980	820	50	1800
EX18-021	0.6	07/26/2018	5	<0.005	0.10	<0.01	<0.05	<10	240	420	<10	660
EX18-022	0.6	07/26/2018	5	<0.005	0.11	<0.01	<0.05	<10	40	140	30	180
EX18-023	0.6	07/26/2018	10	<0.005	0.09	<0.01	<0.05	<10	160	220	30	380
EX18-024	0.6	07/26/2018	5	<0.005	0.06	<0.01	<0.05	<10	30	100	20	130
EX18-025	0.6	07/30/2018	0	<0.005	0.63	<0.01	<0.05	<10	20	160	80	180
EX18-026	0.6	07/30/2018	0	<0.005	0.15	<0.01	<0.05	<10	90	340	150	430
EX18-027	0.6	07/30/2018	0	<0.005	0.17	<0.01	<0.05	<10	420	710	280	1130
EX18-028	0.6	07/30/2018	0	<0.005	0.09	<0.01	<0.05	<10	100	310	140	410
EX18-029	0.6	07/30/2018	0	<0.005	1.21	<0.01	<0.05	<10	40	370	160	410
EX18-R029	*0.6*	*07/30/2018*	*0*	*<0.005*	*1.57*	*<0.01*	*<0.05*	*<10*	*40*	*590*	*260*	*630*
EX18-030	0.6	07/30/2018	5	0.006	0.34	0.05	0.27	<10	140	400	190	540
EX18-031	0.6	07/30/2018	5	<0.005	1.37	<0.01	<0.05	<10	20	360	170	380
EX18-032	0.6	07/30/2018	0	<0.005	0.68	<0.01	<0.05	<10	20	150	70	170
EX18-033	0.6	07/30/2018	0	<0.005	0.92	0.02	0.11	<10	20	50	70	70
EX18-034	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	70	30	70
EX18-035	0.6	08/02/2018	0	<0.005	0.06	<0.01	<0.05	<10	<10	110	50	110
EX18-R035	*0.6*	*08/02/2018*	*0*	*<0.005*	*0.47*	*<0.01*	*<0.05*	*<10*	*10*	*130*	*50*	*140*
EX18-036	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	150	60	150
EX18-037	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	100	10	100
EX18-038	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	40	180	70	220
EX18-039	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	80	30	80
EX18-040	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	250	330	140	580
EX18-041	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	90	40	90
EX18-042	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	430	90	40	520
EX18-043	0.6	08/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	50	30	50
EX18-044	0.6	08/04/2018	5	<0.005	<0.05	<0.01	<0.05	<10	<10	30	20	30
EX18-045	0.6	08/04/2018	0	0.005	<0.05	<0.01	<0.05	<10	30	90	60	120
EX18-046	0.6	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	40	20	60

Notes:

1. m bgs = metres below ground surface
2. Current and/or applicable guidelines are bolded
   (yellow highlight) = Exceeds applicable guidelines
3. View analytical report for more comprehensive results
4. GNWT 2003 = Government of Northwest Territories (GNWT). 2003. Environmental Guideline for Contaminated Site Remediation. November 2003.
5. GPRA 2018 = GatePost Risk Analysis (GPRA). 2018. Site-Specific Risk Assessment: Camp Farewell, Mackenzie Delta, Northwest Territories. Final Report. July 2018.

Table 1: Interim and Confirmatory Soil Sample Analytical Results for Petroleum Hydrocarbons

Sample Designation	Sample Depth (m bgs)	Sample Date (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4	Total F1-F3
			ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES												
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	130	150	400	2800	-
Proposed SSRA Criteria (GPRA 2018)				-	-	-	-	-	-	-	-	**5000**
CONFIRMATORY RESULTS												
EX18-047	0.6	08/04/2018	35	<0.005	<0.05	<0.01	<0.05	<10	800	60	30	860
EX18-048	0.6	08/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	20	20
EX18-049	0.6	08/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	10	<10	10
EX18-050	0.6	08/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	10	20
EX18-R050	*0.6*	*08/08/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*<10*	*10*	*<10*	*10*
EX18-051	0.6	08/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	0
EX18-052	0.6	08/08/2018	0	<0.005	0.4	<0.01	<0.05	<10	<10	130	70	130
EX18-053	0.6	08/08/2018	0	<0.005	0.05	<0.01	<0.05	<10	<10	<10	<10	0
EX18-054	0.6	08/10/2018	0	0.049	0.72	0.42	3.13	70	850	760	70	1680
EX18-055	0.6	08/10/2018	0	<0.005	0.06	<0.01	<0.05	<10	490	740	150	1230
EX18-056	0.6	08/10/2018	5	<0.005	<0.05	<0.01	<0.05	<10	770	960	160	1730
EX18-057	0.6	08/10/2018	5	<0.005	0.12	<0.01	<0.05	<10	660	910	170	1570
EX18-058	0.6	08/10/2018	15	<0.005	0.07	0.03	0.33	30	1790	1550	220	3370
EX18-059	0.6	08/10/2018	5	<0.005	0.29	<0.01	<0.05	<10	160	240	50	400
EX18-060	0.6	08/10/2018	0	<0.005	0.12	0.03	0.28	30	700	590	40	1320
EX18-061	0.6	08/10/2018	50	0.005	0.19	0.12	1.11	50	1510	700	30	2260
EX18-062	0.6	08/10/2018	5	<0.005	0.06	<0.01	0.07	10	800	610	70	1420
EX18-063	0.6	08/10/2018	20	0.007	0.07	0.06	0.86	90	1690	550	20	2330
EX18-064	0.6	08/10/2018	20	<0.005	0.11	0.05	0.53	30	620	380	30	1030
EX18-065	0.6	08/10/2018	15	<0.005	<0.05	<0.01	0.07	20	940	820	100	1780
EX18-066	0.6	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	280	40	420
EX18-067	0.6	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	10	60	30	70
EX18-R067	*0.6*	*08/09/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*30*	*70*	*40*	*100*
EX18-068	0.6	08/09/2018	10	<0.005	<0.05	<0.01	<0.05	<10	20	160	70	180
EX18-069	0.6	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	60	20	80
EX18-070	0.6	08/09/2018	0	<0.005	0.15	0.04	0.13	<10	90	200	80	290
EX18-071	0.6	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	100	40	130
EX18-072	0.6	08/09/2018	5	<0.005	<0.05	<0.01	<0.05	<10	20	210	130	230
EX18-073	0.6	08/09/2018	5	<0.005	<0.05	<0.01	<0.05	<10	110	190	90	300
EX18-074	0.6	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	60	20	60
EX18-075	0.6	08/15/2018	0	<0.005	0.58	0.01	0.08	<10	<10	60	<10	60
EX18-076	0.6	08/15/2018	0	<0.005	1.3	<0.01	<0.05	<10	10	170	20	180
EX18-077	0.6	08/15/2018	0	<0.005	6.57	<0.01	0.08	<10	780	740	150	1520
EX18-078	0.6	08/15/2018	0	<0.005	0.45	<0.01	<0.05	<10	<10	180	30	180
EX18-079	0.6	08/15/2018	0	<0.005	0.13	<0.01	<0.05	<10	<10	80	<10	80
EX18-080	0.6	08/15/2018	0	<0.005	0.48	<0.01	<0.05	<10	<10	90	10	90
EX18-081	0.6	08/15/2018	0	<0.005	<0.05	<0.01	<0.05	<10	180	160	<10	340
EX18-082	0.6	08/15/2018	0	<0.005	0.86	<0.01	<0.05	<10	<10	100	10	100
EX18-083	0.6	08/15/2018	0	<0.005	<0.05	<0.01	<0.05	<10	40	170	30	210
EX18-084	0.6	08/15/2018	0	<0.005	0.3	<0.01	<0.05	<10	<10	80	10	80
EX18-085	0.6	08/15/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	170	<10	270
EX18-086	0.6	08/15/2018	0	<0.005	0.21	<0.01	<0.05	<10	<10	70	10	70
EX18-087	0.6	08/15/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	80	20	80
EX18-088	0.6	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	120	20	120
EX18-089	0.6	08/16/2018	0	<0.005	<0.05	<0.01	0.22	<10	30	470	90	500
EX18-090	0.6	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	1010	90	1010
EX18-091	0.6	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	20	<10	40
EX18-R091	*0.6*	*08/16/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*20*	*20*	*<10*	*40*

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Table 1: Interim and Confirmatory Soil Sample Analytical Results for Petroleum Hydrocarbons

Sample Designation	Sample Depth (m bgs)	Sample Date (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4	Total F1-F3
			ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES												
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	130	150	400	2800	-
Proposed SSRA Criteria (GPRA 2018)				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5000**
CONFIRMATORY RESULTS												
EX18-092	0.6	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	0
EX18-093	0.6	08/16/2018	0	<0.005	2.27	<0.01	<0.05	<10	<10	200	40	200
EX18-094	0.6	08/16/2018	0	<0.005	0.38	0.07	0.95	<10	740	150	<10	890
EX18-095	0.6	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	40	100	20	140
EX18-096	0.6	08/16/2018	0	<0.005	0.15	<0.01	<0.05	<10	<10	160	50	160
EX18-097	0.6	08/16/2018	0	<0.005	2.22	<0.01	0.07	<10	<10	40	10	40
EX18-098	0.6	08/16/2018	0	<0.005	1.81	0.04	0.37	<10	30	250	80	280
EX18-099	0.6	08/17/2018	20	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	0
EX18-100	0.6	08/17/2018	0	<0.005	1.61	<0.01	<0.05	<10	50	340	130	390
EX18-101	0.6	08/17/2018	25	<0.005	8.14	<0.01	<0.05	<10	20	460	230	480
EX18-102	0.6	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	100	41	120
EX18-103	0.6	08/19/2018	15	<0.005	0.56	<0.01	0.06	<10	20	140	40	160
EX18-104	0.6	08/19/2018	5	<0.005	<0.05	<0.01	<0.05	<10	10	40	20	50
EX18-105	0.6	08/20/2018	20	<0.005	4.74	<0.01	<0.05	<10	20	150	70	170
EX18-106	0.6	08/20/2018	10	<0.005	4.36	<0.01	<0.05	<10	50	220	70	270
EX18-R106	*0.6*	*08/20/2018*	*10*	*<0.005*	*4.45*	*<0.01*	*<0.05*	*<10*	*60*	*260*	*90*	*320*
EX18-107	0.6	08/20/2018	5	<0.005	0.83	0.03	0.2	<10	40	410	180	450
EX18-108	0.6	08/20/2018	0	<0.005	5.68	0.38	2.48	<10	10	470	210	480
EX18-109	0.6	08/20/2018	5	0.044	5.97	<0.01	<0.05	<10	30	1230	580	1260
EX18-110	0.6	08/20/2018	10	<0.005	<0.05	<0.01	<0.05	<10	120	370	110	490
EX18-111	0.6	08/21/2018	20	<0.005	3.81	0.17	1	40	320	250	100	610
EX18-112	0.6	08/21/2018	20	<0.005	1.06	0.24	0.91	<10	390	250	70	640
EX18-113	0.6	08/21/2018	30	0.536	9.67	0.15	0.86	10	110	490	210	610
EX18-114	0.6	08/21/2018	35	0.049	12.3	4.87	27.8	10	30	690	350	730
EX18-115	0.6	08/21/2018	30	<0.005	1.29	<0.01	0.13	<10	150	290	100	440
EX18-116	0.6	08/21/2018	0	<0.005	0.38	0.05	0.35	<10	100	190	40	290
EX18-117	0.6	08/22/2018	35	<0.005	0.96	<0.01	<0.05	<10	20	170	70	190
EX18-118	0.6	08/23/2018	15	<0.005	5.29	<0.01	<0.05	<10	20	240	120	260
EX18-119	0.6	08/23/2018	15	<0.005	0.12	0.01	0.08	<10	100	180	50	280
EX18-120	0.6	08/23/2018	30	<0.005	0.38	<0.01	<0.05	<10	250	200	50	450
EX18-121	0.6	08/23/2018	20	<0.005	0.32	0.04	0.25	<10	20	250	120	270
EX18-122	0.6	08/23/2018	20	<0.005	0.07	<0.01	<0.05	<10	10	160	60	170
EX18-123	0.6	08/23/2018	15	<0.005	0.56	<0.01	0.06	<10	30	150	70	180
EX18-R123	*0.6*	*08/23/2018*	*15*	*<0.005*	*0.64*	*<0.01*	*0.11*	*<10*	*50*	*260*	*100*	*310*
EX18-124	0.6	08/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	<10	30	20	30
EX18-125	0.6	08/26/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	<10	20
EX18-126	0.6	08/26/2018	0	<0.005	0.17	<0.01	<0.05	<10	980	1180	30	2160
EX18-127	0.6	08/26/2018	0	<0.005	<0.05	<0.01	<0.05	<10	340	380	30	720
EX18-128	0.6	08/26/2018	0	0.095	0.48	0.16	0.61	<10	30	160	60	190
EX18-129	0.6	08/26/2018	10	<0.005	0.18	0.01	0.09	10	330	330	30	670
EX18-130	0.6	08/26/2018	0	<0.005	0.14	<0.01	0.07	50	1010	800	40	1860
EX18-131	0.6	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	60	20	60
EX18-132	0.6	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	10	20
EX18-133	0.6	08/27/2018	5	<0.005	<0.05	<0.01	<0.05	<10	30	60	30	90
EX18-134	0.6	08/27/2018	5	<0.005	<0.05	<0.01	<0.05	<10	90	230	70	320
EX18-135	0.6	08/27/2018	5	<0.005	<0.05	<0.01	<0.05	<10	<10	110	30	110
EX18-136	0.6	08/29/2018	0	<0.005	<0.05	<0.01	<0.05	<10	40	50	20	90
EX18-137	0.6	08/29/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	10	<10	10

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Table 1: Interim and Confirmatory Soil Sample Analytical Results for Petroleum Hydrocarbons

Sample Designation	Sample Depth (m bgs)	Sample Date (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4	Total F1-F3
			ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES												
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	130	150	400	2800	-
Proposed SSRA Criteria (GPRA 2018)				**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5000**
CONFIRMATORY RESULTS												
EX18-138	0.6	08/29/2018	5	<0.005	<0.05	0.01	0.11	<10	120	1140	40	1260
EX18-139	0.6	08/29/2018	0	<0.005	<0.05	<0.01	<0.05	<10	10	110	30	120
EX18-R139	*0.6*	*08/29/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*<10*	*70*	*30*	*70*
EX18-140	0.6	08/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	30	20	50
EX18-141	0.6	08/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	10	20
EX18-142	0.6	08/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	60	30	90
EX18-143	0.6	08/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	80	20	80
EX18-144	0.6	09/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	360	150	360
EX18-145	0.6	09/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	10	0
EX18-146	0.6	09/02/2018	0	<0.005	0.19	<0.01	<0.05	<10	40	260	70	300
EX18-147	0.6	09/02/2018	0	<0.005	0.14	<0.01	<0.05	<10	400	140	40	540
EX18-148	0.6	09/02/2018	5	<0.005	0.10	<0.01	<0.05	<10	<10	70	40	70
EX18-149	0.6	09/02/2018	0	<0.005	<0.05	<0.01	<0.05	<10	190	260	50	450
EX18-150	0.6	09/04/2018	80	<0.005	<0.05	<0.01	<0.05	<10	10	190	<10	200
EX18-151	0.6	09/04/2018	0	<0.005	0.18	<0.01	<0.05	<10	<10	60	<10	60
EX18-152	0.6	09/04/2018	20	<0.005	<0.05	<0.01	<0.05	<10	60	190	20	250
EX18-153	0.6	09/04/2018	0	<0.005	0.11	<0.01	<0.05	<10	<10	150	20	150
EX18-154	0.6	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	260	100	280
EX18-155	0.6	09/05/2018	0	<0.005	2.74	<0.01	<0.05	<10	<10	500	260	500
EX18-156	0.6	09/06/2018	0	<0.005	4.19	<0.01	<0.05	<10	310	420	120	730
EX18-157	0.6	09/06/2018	5	0.023	1.91	0.03	0.14	<10	<10	180	60	180
EX18-158	0.6	09/06/2018	0	<0.005	1.74	<0.01	0.08	<10	<10	70	20	70
EX18-159	0.6	09/06/2018	0	<0.005	2.13	<0.01	<0.05	<10	20	190	<10	210
EX18-160	0.6	09/06/2018	0	<0.005	0.91	0.06	0.36	<10	230	260	30	490
EX18-161	0.6	09/06/2018	1000	5.87	192	68.8	362	1370	23100	4440	2530	28910
EX18-162	0.6	09/08/2018	90	<0.005	3.77	0.02	0.1	<10	20	300	90	320
EX18-R162	*0.6*	*09/08/2018*	*90*	*<0.005*	*0.38*	*0.01*	*0.06*	*<10*	*60*	*1170*	*400*	*1230*
EX18-163	0.6	09/08/2018	0	<0.005	4.29	<0.01	<0.05	<10	20	400	140	420
EX18-164	0.6	09/08/2018	5	<0.005	<0.05	0.04	0.17	<10	30	420	160	450
EX18-165	0.6	09/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	570	210	600
EX18-166	0.6	09/08/2018	5	<0.005	2.42	<0.01	0.06	<10	20	480	200	500
EX18-167	0.6	09/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	10	<10	10
EX18-168	0.6	09/08/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	10	<10	10
EX18-169	0.6	09/08/2018	0	<0.005	0.05	<0.01	<0.05	<10	10	480	170	490
EX18-170	0.6	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	<10	20
EX18-171	0.6	09/10/2018	5	<0.005	1.35	<0.01	<0.05	<10	20	90	20	110
EX18-172	0.6	09/10/2018	0	<0.005	2.16	<0.01	<0.05	<10	<10	120	40	120
EX18-173	0.6	09/10/2018	0	<0.005	0.78	<0.01	<0.05	<10	230	940	110	1170

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Table 2: Windrow Soil Sample Analytical Results for Petroleum Hydrocarbons

GENERAL											
Location	**Sample Designation**	**Sample Date** (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
		Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES											
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	**130**	**150**	**400**	**2800**
RESULTS											
Windrow 1	WR1-001	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	670	540	60
	WR1-002	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	510	460	50
	WR1-003	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	360	340	40
	WR1-004	07/26/2018	20	<0.005	<0.05	<0.01	<0.05	<10	410	380	40
	WR1-005	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	110	210	40
Windrow 2	WR2-001	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	300	450	40
	WR2-R001	*07/26/2018*	*5*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*290*	*400*	*40*
	WR2-002	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	120	310	60
	WR2-003	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	320	490	60
Windrow 3	WR3-001	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	240	380	30
	WR3-002	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	60	190	40
	WR3-003	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	100	190	30
	WR3-004	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	150	390	90
	WR3-005	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	130	260	30
Windrow 4	WR4-001	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	160	310	50
	WR4-002	07/26/2018	15	<0.005	<0.05	<0.01	<0.05	<10	100	230	50
	WR4-003	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	240	350	60
	WR4-004	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	190	450	80
	WR4-005	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	360	420	70
	WR4-R005	*07/26/2018*	*10*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*240*	*250*	*<10*
Windrow 5	WR5-001	07/26/2018	30	<0.005	<0.05	<0.01	<0.05	<10	1170	760	10
	WR5-002	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	1040	800	40
Windrow 7A	WR7A-001	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	40	30
	WR7A-002	08/04/2018	0	0.005	<0.05	<0.01	<0.05	<10	10	50	20
	WR7A-R002	*08/04/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*10*	*50*	*20*
	WR7A-003	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	50	20
	WR7A-004	08/04/2018	0	0.005	<0.05	<0.01	<0.05	<10	20	40	20
	WR7A-005	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	50	40
Windrow 8	WR8-001	07/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	220	270	40
	WR8-002	07/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	150	230	70
	WR8-003	07/30/2018	0	4.14	23.9	4.91	27.3	130	220	370	170
	WR8-004	07/30/2018	5	<0.005	<0.05	<0.01	<0.05	<10	320	640	160
	WR8-005	07/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	290	500	90
Windrow 14	WR14-001	07/30/2018	10	<0.005	<0.05	<0.01	<0.05	<10	260	190	50
	WR14-002	07/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	210	170	60
	WR14-003	07/30/2018	0	<0.005	<0.05	<0.01	<0.05	<10	270	200	50
	WR14-004	07/30/2018	0	<0.005	<0.05	<0.01	0.07	<10	180	230	80
	WR14-005	07/30/2018	0	<0.005	0.07	0.01	0.1	<10	300	330	110
Windrow 15	WR15-001	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	80	250	130
	WR15-002	08/04/2018	0	0.008	<0.05	<0.01	<0.05	<10	20	100	60
	WR15-003	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	90	90	50
	WR15-004	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	90	70
	WR15-005	08/04/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	50	30
	WR15-R005	*08/04/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*30*	*60*	*30*
Windrow 18	WR18-001	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	240	340	60
	WR18-002	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	300	420	60
	WR18-003	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	420	560	80
	WR18-004	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	200	30
	WR18-005	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	470	370	40

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Table 2: Windrow Soil Sample Analytical Results for Petroleum Hydrocarbons

GENERAL											
Location	**Sample Designation**	**Sample Date** (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
		Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES											
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	**130**	**150**	**400**	**2800**
RESULTS											
Windrow 18	WR18-006	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	190	200	20
	WR18-007	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	310	380	40
	WR18-008	08/09/2018	30	<0.005	<0.05	<0.01	<0.05	<10	790	490	40
	WR18-R008	*08/09/2018*	*30*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*550*	*440*	*50*
Windrow 19	WR19-001	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	180	210	40
	WR19-002	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	190	40
	WR19-R002	*08/09/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*120*	*210*	*60*
	WR19-003	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	40	100	40
	WR19-004	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	60	130	40
	WR19-005	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	60	160	50
	WR19-006	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	260	50
	WR19-007	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	270	60
	WR19-008	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	110	250	50
	WR19-009	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	280	50
	WR19-010	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	200	40
Windrow 21	WR21-001	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	240	40
	WR21-002	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	330	440	50
	WR21-003	08/10/2018	-	<0.005	<0.05	<0.01	<0.05	<10	120	210	40
	WR21-004	08/10/2018	-	<0.005	<0.05	<0.01	<0.05	<10	320	360	20
	WR21-005	08/10/2018	-	<0.005	<0.05	<0.01	<0.05	<10	420	450	50
	WR21-007	08/10/2018	-	<0.005	<0.05	<0.01	<0.05	<10	260	310	60
	WR21-009	08/27/2018	-	<0.005	<0.05	<0.01	<0.05	<10	100	200	40
	WR21-010	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	150	260	50
	WR21-011	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	200	40
	WR21-013	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	180	260	40
	WR21-014	08/27/2018	0	<0.005	0.17	<0.01	<0.05	<10	110	220	50
	WR21-015	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	240	50
	WR21-016	08/27/2018	0	<0.005	<0.05	<0.01	<0.05	<10	280	390	60
Windrow 22	WR22-001	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	500	460	40
	WR22-002	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	110	230	90
	WR22-003	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	250	280	70
	WR22-R003	*08/09/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*240*	*300*	*80*
	WR22-004	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	170	250	70
	WR22-005	08/09/2018	0	<0.005	0.38	0.08	0.53	<10	30	120	40
	WR22-006	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	200	220	50
	WR22-007	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	190	250	60
	WR22-008	08/09/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	200	50
Windrow 23	WR23-001	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	340	400	50
	WR23-002	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	420	500	60
	WR23-003	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	270	310	30
	WR23-004	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	310	460	70
	WR23-005	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	260	330	30
	WR23-006	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	280	410	70
	WR23-007	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	300	440	70
	WR23-008	08/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	200	230	30
	WR23W-001	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	200	360	90
	WR23W-002	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	260	430	90
	WR23W-003	09/03/2018	5	<0.005	<0.05	<0.01	<0.05	<10	220	360	70
	WR23W-004	09/03/2018	5	<0.005	<0.05	<0.01	<0.05	<10	220	400	100

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		Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES											
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	**130**	**150**	**400**	**2800**
RESULTS											
Windrow 23	WR23W-005	09/03/2018	10	<0.005	0.74	0.02	0.07	<10	180	280	70
	WR23E-001	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	230	380	50
	WR23E-002	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	160	240	20
	WR23E-003	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	260	30
	WR23E-004	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	250	380	60
	WR23E-005	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	220	340	30
	WR23E-006	09/05/2018	0	<0.005	<0.05	<0.01	<0.05	<10	230	300	20
Windrow 24	WR24-001	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	170	20
	WR24-002	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	270	340	30
	WR24-003	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	310	420	70
	WR24-004	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	210	310	60
	WR24-005	08/16/2018	0	<0.005	0.06	<0.01	<0.05	<10	190	280	50
	WR24-006	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	230	340	60
	WR24-007	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	280	350	50
	WR24-008	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	290	290	30
	WR24-009	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	320	80
	WR24-010	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	110	220	60
	WR24-011	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	320	80
	WR24-012	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	170	350	60
	WR24-013	09/10/2018	5	<0.005	<0.05	<0.01	<0.05	<10	220	330	70
	WR24-014	09/10/2018	10	<0.005	<0.05	<0.01	<0.05	<10	140	340	80
	WR24-015	09/10/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	330	80
	WR24-016	09/10/2018	5	<0.005	<0.05	<0.01	<0.05	<10	140	320	70
	WR24-R016	*09/10/2018*	*5*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*140*	*330*	*80*
Windrow 25	WR25-001	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	170	60
	WR25-002	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	220	240	50
	WR25-003	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	70	160	60
	WR25-004	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	250	70
	WR25-005	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	150	240	70
	WR25-006	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	90	120	30
	WR25-R006	*08/16/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*120*	*190*	*90*
	WR25-007	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	280	190	70
	WR25-008	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	430	510	110
Windrow 26	WR26-001	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	150	330	80
	WR26-002	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	350	450	70
	WR26-003	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	260	390	70
	WR26-004	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	290	350	50
	WR26-005	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	280	310	20
	WR26-006	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	400	480	40
	WR26-007	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	300	450	80
	WR26-008	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	220	350	60
Windrow 27	WR27-001	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	350	440	50
	WR27-002	08/16/2018	0	<0.005	0.07	<0.01	<0.05	<10	150	250	60
	WR27-003	08/16/2018	5	0.009	0.09	0.01	0.15	<10	430	470	120
	WR27-004	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	550	590	90
	WR27-005	08/16/2018	5	<0.005	<0.05	<0.01	<0.05	<10	380	360	50
	WR27-006	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	380	510	100
	WR27-007	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	250	80
	WR27-008	08/16/2018	0	<0.005	<0.05	<0.01	<0.05	<10	220	370	70

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Location	**Sample Designation**	**Sample Date** (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
		Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES											
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	**130**	**150**	**400**	**2800**
RESULTS											
Windrow 27	WR27W-001	08/31/2018	0	<0.005	0.12	0.04	0.12	<10	190	340	90
	WR27W-002	08/31/2018	5	<0.005	<0.05	<0.01	<0.05	<10	110	190	40
	WR27W-003	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	200	40
	WR27W-004	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	140	170	40
	WR27W-005	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	150	210	40
	WR27W-006	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	150	30
	WR27E-001	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	160	360	110
	WR27E-002	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	130	220	60
	WR27E-003	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	120	150	50
	WR27E-004	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	100	200	60
	WR27E-005	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	190	330	80
	WR27E-006	09/03/2018	0	<0.005	<0.05	<0.01	<0.05	<10	160	290	70
Windrow 28	WR28-001	08/17/2018	5	<0.005	<0.05	<0.01	<0.05	<10	10	90	30
	WR28-002	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	110	180	20
	WR28-R002	*08/17/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*90*	*140*	*20*
	WR28-003	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	80	120	20
	WR28-004	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	90	30
	WR28-005	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	30	<10
	WR28-006	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	80	150	30
	WR28-007	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	110	140	20
	WR28-008	08/17/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	60	20
Windrow 29	WR29-001	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	10	70	20
	WR29-002	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	20	50	10
	WR29-003	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	20	50	20
	WR29-004	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	<10	40	10
	WR29-005	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	70	70	20
	WR29-006	08/24/2018	-	<0.005	<0.05	<0.01	<0.05	<10	10	50	20
Windrow 30	WR30-001	08/29/2018	0	<0.005	<0.05	<0.01	<0.05	<10	10	60	10
	WR30-002	08/31/2018	5	<0.005	<0.05	<0.01	<0.05	<10	10	40	10
	WR30-003	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	70	20
	WR30-004	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	50	10
	WR30-005	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	30	80	20
	WR30-006	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	50	50	10
	WR30-R006	*08/31/2018*	*0*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*210*	*90*	*30*
	WR30-007	08/31/2018	0	<0.005	<0.05	<0.01	<0.05	<10	20	60	20

Notes:

1. m bgs = metres below ground surface
2. Current and/or applicable guidelines are bolded
   (yellow highlight) = Exceeds applicable guidelines
3. View analytical report for more comprehensive results
4. GNWT 2003 = Government of Northwest Territories (GNWT). 2003. Environmental Guideline for Contaminated Site Remediation. November 2003.

Table 3: Airstrip Borehole Soil Sample Analytical Results for Petroleum Hydrocarbons

Sample Designation	Sample Depth (m bgs)	Sample Date (yyyy-mm-dd)	OVA (Field Screening)	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
			ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
GUIDELINES											
Residential/Parkland - Surface (0-1.5 m bgs) (GNWT 2003)				**0.5**	**0.8**	**1.2**	**1**	**130**	**150**	**400**	**2800**
RESULTS											
BH18-01	0-0.3	07/26/2018	130	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10
	0.6-0.9	07/26/2018	10	<0.005	<0.05	<0.01	<0.05	<10	<10	10	20
BH18-02	0-0.3	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	30	<10	<10
	0.3-0.6	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10
BH18-03	0-0.3	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	<10	30	20
	0.6-0.9	07/26/2018	5	<0.005	<0.05	<0.01	<0.05	<10	<10	50	40
BH18-04	0.3-0.6	07/26/2018	20	<0.005	<0.05	<0.01	<0.05	<10	<10	40	30
	0.3-0.6 (Rep)	*07/26/2018*	*20*	*<0.005*	*<0.05*	*<0.01*	*<0.05*	*<10*	*<10*	*30*	*20*
	0.6-0.9	07/26/2018	20	<0.005	<0.05	<0.01	<0.05	<10	<10	500	330
BH18-05	0-0.3	07/26/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	20
	0.3-0.6	07/26/2018	0	<0.005	<0.05	<0.01	<0.05	<10	<10	20	<10

Notes:

1. m bgs = metres below ground surface
2. Current and/or applicable guidelines are bolded
   (yellow highlight) = Exceeds applicable guidelines
3. View analytical report for more comprehensive results
4. GNWT 2003 = Government of Northwest Territories (GNWT). 2003. Environmental Guideline for Contaminated Site Remediation. November 2003.

Table 4: Summary of Quality Assurance / Quality Control Results for Petroleum Hydrocarbons

GENERAL			PETROLEUM HYDROCARBONS							
Sample Designation	**Sample Depth** (m bgs)	**Sample Date (yyyy-mm-dd)**	Benzene	Toluene	Ethylbenzene	Xylenes	F1	F2	F3	F4
		Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Reported Detection Limits			0.005	0.05	0.01	0.05	10	10	10	10
EX18-029	0.6	07/30/2018	<0.005	1.21	<0.01	<0.05	<10	40	370	160
EX18-R029	0.6	07/30/2018	<0.005	1.57	<0.01	<0.05	<10	40	590	260
Relative Percent Difference (RPD) (%)			0%	**26%**	0%	0%	0%	0%	**46%**	**48%**
Absolute Difference			**0**	0	**0**	**0**	**0**	**0**	220	100
EX18-035	0.6	08/02/2018	<0.005	0.06	<0.01	<0.05	<10	<10	110	50
EX18-R035	0.6	08/02/2018	<0.005	0.47	<0.01	<0.05	<10	10	130	50
Relative Percent Difference (RPD) (%)			0%	155%	0%	0%	0%	-	**17%**	**0%**
Absolute Difference			**0**	**0.41**	**0**	**0**	**0**	**5**[(a)]	20	0
EX18-050	0.6	08/08/2018	<0.005	<0.05	<0.01	<0.05	<10	<10	20	10
EX18-R050	0.6	08/08/2018	<0.005	<0.05	<0.01	<0.05	<10	<10	10	<10
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	0%	67%	-
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**0**	**10**	**5**[(a)]
EX18-067	0.6	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	10	60	30
EX18-R067	0.6	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	30	70	40
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	100%	**15%**	29%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**20**	10	**10**
EX18-091	0.6	08/16/2018	<0.005	<0.05	<0.01	<0.05	<10	20	20	<10
EX18-R091	0.6	08/16/2018	<0.005	<0.05	<0.01	<0.05	<10	20	20	<10
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	0%	0%	0%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EX18-106	0.6	08/20/2018	<0.005	4.36	<0.01	<0.05	<10	50	220	70
EX18-R106	0.6	08/20/2018	<0.005	4.45	<0.01	<0.05	<10	60	260	90
Relative Percent Difference (RPD) (%)			0%	**2%**	0%	0%	0%	**18%**	**17%**	**25%**
Absolute Difference			**0**	0.09	**0**	**0**	**0**	10	40	20
EX18-123	0.6	08/23/2018	<0.005	0.56	<0.01	0.06	<10	30	150	70
EX18-R123	0.6	08/23/2018	<0.005	0.64	<0.01	0.11	<10	50	260	100
Relative Percent Difference (RPD) (%)			0%	**13%**	0%	59%	0%	50%	**54%**	**35%**
Absolute Difference			**0**	0.08	**0**	**0.05**	**0**	**20**	110	30
EX18-139	0.6	08/29/2018	<0.005	<0.05	<0.01	<0.05	<10	10	110	30
EX18-R139	0.6	08/29/2018	<0.005	<0.05	<0.01	<0.05	<10	<10	70	30
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	-	**44%**	0%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**5**[(a)]	40	**0**
EX18-162	0.6	09/08/2018	<0.005	3.77	0.02	0.1	<10	20	300	90
EX18-R162	0.6	09/08/2018	<0.005	0.38	0.01	0.06	<10	60	1170	400
Relative Percent Difference (RPD) (%)			0%	**163%**	67%	50%	0%	100%	**118%**	**127%**
Absolute Difference			**0**	3.39	**0.01**	**0.04**	**0**	**40**	870	310
WR2-001	-	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	300	450	40
WR2-R001	-	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	290	400	40
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**3%**	**12%**	0%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	10	50	**0**
WR4-005	-	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	360	420	70
WR4-R005	-	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	240	250	<10
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**40%**	**51%**	-
Absolute Difference			**0**	**0**	**0**	**0**	**0**	120	170	**65**[(a)]
WR7A-002	-	08/04/2018	0.005	<0.05	<0.01	<0.05	<10	10	50	20
WR7A-R002	-	08/04/2018	<0.005	<0.05	<0.01	<0.05	<10	10	50	20
Relative Percent Difference (RPD) (%)			-	0%	0%	0%	0%	0%	**0%**	0%
Absolute Difference			**0.0025**[(a)]	**0**	**0**	**0**	**0**	**0**	0	**0**
WR15-005	-	08/04/2018	<0.005	<0.05	<0.01	<0.05	<10	30	50	30
WR15-R005	-	08/04/2018	<0.005	<0.05	<0.01	<0.05	<10	30	60	30
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	0%	**18%**	0%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**0**	10	**0**
WR18-008	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	790	490	40
WR18-R008	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	550	440	50
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**36%**	**11%**	22%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	240	50	**10**
WR19-002	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	140	190	40
WR19-R002	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	120	210	60
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**15%**	**10%**	40%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	20	20	**20**
WR22-003	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	250	280	70
WR22-R003	-	08/09/2018	<0.005	<0.05	<0.01	<0.05	<10	240	300	80
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**4%**	**7%**	**13%**
Absolute Difference			**0**	**0**	**0**	**0**	**0**	10	20	10
WR24-016	-	09/10/2018	<0.005	<0.05	<0.01	<0.05	<10	140	320	70
WR24-R016	-	09/10/2018	<0.005	<0.05	<0.01	<0.05	<10	140	330	80
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**0%**	**3%**	**13%**
Absolute Difference			**0**	**0**	**0**	**0**	**0**	0	10	10
WR25-006	-	08/16/2018	<0.005	<0.05	<0.01	<0.05	<10	90	120	30
WR25-R006	-	08/16/2018	<0.005	<0.05	<0.01	<0.05	<10	120	190	90
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**29%**	**45%**	143%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	30	70	**25**
WR28-002	-	08/17/2018	<0.005	<0.05	<0.01	<0.05	<10	110	180	20
WR28-R002	-	08/17/2018	<0.005	<0.05	<0.01	<0.05	<10	90	140	20
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**20%**	**25%**	0%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	20	40	**0**
WR30-006	-	08/31/2018	<0.005	<0.05	<0.01	<0.05	<10	50	50	10
WR30-R006	-	08/31/2018	<0.005	<0.05	<0.01	<0.05	<10	210	90	30
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	**123%**	**57%**	100%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	160	40	**20**
BH18-04	0.3 - 0.6	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	<10	40	30
BH18-R04	0.3 - 0.6	07/26/2018	<0.005	<0.05	<0.01	<0.05	<10	<10	30	20
Relative Percent Difference (RPD) (%)			0%	0%	0%	0%	0%	0%	**29%**	40%
Absolute Difference			**0**	**0**	**0**	**0**	**0**	**0**	10	**10**

Notes:

1. Applicable values (RPD or AD) are bolded. RPD is applicable if parameter concentrations in both samples are greater than or equal to 5x the detection limit; otherwise AD is applicable
2. (yellow highlight) = Exceeds Zeiner criteria (RPD must be less than or equal to 40%, or AD is greater than twice the reported detection limit)
3. View analytical report for more comprehensive results
4. [(a)] = Difference between the reported concentration and half the detection limit

APPENDIX VII

BIC Scale

Appendix VII
BIC Scale

VII-1 BIC SCALE SUMMARY

The Biogenic Interference Calculation (BIC) Scale is one of several approaches for identifying false PHC fraction F3 exceedances in organic soil. It provides a mathematical tool to determine if an exceedance of the applicable guideline value is due to the presence of naturally occurring biogenic organic compounds (AEP 2018).

The BIC Scale approach considers the standard carbon ranges for PHC fractions F2 (C_{10}-C_{16}) and F3 (C_{16}-C_{34}), and further divides PHC fraction F3 into two sub-fractions: F3a (C_{16}-C_{22}) and F3b (C_{22}-C_{34}). The premise of the BIC scale approach is that clean (uncontaminated) organic soils typically have four characteristics:

1. PHC fraction F2 concentrations are less than 30 mg/kg and do not exceed the guidelines;
2. PHC fraction F3 concentrations are detectable and may exceed the guidelines;
3. PHC fraction F4 concentrations are detectable but do not exceed the guidelines; and
4. Greater than 85% of the total PHC fraction F3 range occurs within the F3b range.

The calculation compares the concentrations of PHC fraction F2 and subfraction F3b, as shown in the following formula:

$$BIC = \frac{(PHC\ F2)}{(PHC\ F2) + (PHC\ F3b)}\ x\ 100$$

Note: When F2 concentrations are reported as less than the laboratory's Reported Detection Limit (RDL), the F2 concentration is calculated as half the RDL concentration.

The threshold value for determining whether a sample is a true or false exceedance is 10%. This value was developed through empirical observations of PHC concentrations and carbon distributions in trial samples.

Samples with BIC values of <10% indicate potentially false exceedances of the PHC fraction F3 guideline, while samples with BIC values of greater or equal to 10% indicate potentially true PHC fraction F3 guideline exceedances.

VII-1.1 BIC Scale Limitations

The BIC Scale can only be applied to light PHC products with detectable PHC fraction F2 concentrations (e.g. gasoline, diesel, etc.). Clean (uncontaminated) organics soil and heavy PHC products (e.g. bitumen, motor oil, etc.) have similar carbon ranges. In order to rule out the presence of heavy PHC products, the BIC Scale is best used in conjunction with an evaluation of Gas Chromatogram-Flame Ionization Detector chromatograms for the sampled soils (AEP 2018).

APPENDIX VIII

Quality Assurance/Quality Control

Appendix VIII
Quality Assurance/Quality Control

I-1 QUALITY ASSURANCE/QUALITY CONTROL

As part of routine Quality Assurance/Quality Control (QA/QC), 21 field replicate soil samples were collected during the remediation program and sent to the laboratory for analysis. The replicate samples were collected at the same time as the initial soil sample and following the same sampling procedures.

The purpose of the replicate samples is to ensure consistency in the analytical results that the laboratory produces. Large variances between replicate results and the original sampling results could indicate errors in the testing process conducted by the laboratory. Variances in results are investigated further with the laboratory.

Precision in analytical results may be evaluated by calculating the relative percent difference (RPD) or absolute difference (AD) of replicate samples using the following formulae:

$$RPD = \frac{(S - D)}{(S + D) / 2} \; x\ 100 \qquad AD = \quad (S - D)$$

where: RPD and AD are absolute values,
S is the original sample result (mg/kg), and,
D is the replicate sample result (mg/kg).

Zeiner's *Environmental Standard's Field Duplicate Criteria* has been applied in order to evaluate the precision of the results (Zeiner 1994).

If both the original and replicate soil sample concentrations are greater than five times the reported detection limit (RDL) for a given parameter, the RPD must be less than or equal to 40% to be considered precise. If the results lie outside of the range, they should be considered estimates only.

If at least one of the sample concentrations is less than or equal to five times the RDL for a given parameter, the AD should be less than or equal to two times the RDL. If the AD is greater than two times the RDL, the results should be considered estimates only.

If one of the sample concentrations is positive and its replicate sample concentration is less than the RDL, the AD between the reported concentration and one-half the RDL should be less than or equal to two times the RDL. If the AD is greater than two times the RDL, the results should be considered estimates only.

Chain-of-custody (CoC) procedures were followed throughout the sampling program. CoC forms were provided by AGAT and filled out by KCB personnel for each sample delivered to the laboratory.

AGAT has internal QA/QC protocols and procedures to ensure accuracy and consistency of results. These procedures include COC tracking, storage and holding times, instrument calibration, surrogate matrix spikes, blanks, and laboratory duplicates.

APPENDIX IX

GPRA Site-Specific Risk Assessment

GATEPOST
RISK ANALYSIS

Site-Specific Risk Assessment: Camp Farewell, Mackenzie Delta, Northwest Territories

Final Report

Submitted to:

Shell Canada Energy

Submitted by:

Ken Froese, PhD, PChem

GatePost Risk Analysis

July 2018

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INTRODUCTION

Subsequent to completing a qualitative screening level risk assessment of the Camp Farewell drilling program site (GPRA 2017), GatePost Risk Analysis was retained by Shell Canada Energy to conduct a site-specific risk assessment (SSRA) to provide further quantitative support for a risk-based approach to the remediation of this site.

SUMMARY OF SCREENING LEVEL RISK ASSESSMENT (GPRA 2017)

The 2017 screening level risk assessment of the post-remediation scenario at Camp Farewell determined that numerous exposure pathways could be ruled out as potential transport and exposure mechanisms: these were groundwater to drinking water; groundwater to freshwater aquatic life; exposure to contaminants in surface soil via direct soil contact or ingestion; and indoor vapour transport.

The majority of the Government of Northwest Territories (GNWT) *de minimis* guidelines are based on the protection of the first two of these pathways: groundwater as a resource for drinking water and as environments for freshwater aquatic life. These two pathways were eliminated from consideration as potential risk pathways for four reasons: the shallow soil active zone in which any groundwater freezes annually; the permafrost barrier near 1.5 m depth; the distance to surface water bodies; and the remediation of surface soil to GNWT guidelines.

Volatile organic compounds (VOCs) and barium exceed the *de minimis* guidelines; however, they can be ruled out as contaminants of concern in the subsoil because of the aforementioned elimination of the groundwater to drinking water and groundwater to freshwater aquatic life pathways, as these pathways are inapplicable to the site. Concentrations of the VOCs and barium are well below thresholds for ecological direct contact.

Vapour exposure was not considered as a viable exposure pathway due to two main factors: average soil temperature is low and the soil is frozen or snow covered for a significant portion of the year; regional building construction methods do not include slab-on-grade foundations or basements, rather, they are raised on pilings due to climate and permafrost conditions.

For petroleum hydrocarbons (PHCs), the single remaining potential exposure pathway is ecological direct contact in subsoil. And while the maximum F2 and F3 in the tank farm area did exceed the GNWT subsoil eco contact guidelines, fewer than 4% of the 2015-2016 tank farm area samples exceeded these guideline values. Given the small percentage of such samples, leaving even these higher concentrations of contaminants in place is anticipated to result in very low risks to any ecological receptors through exposure to F2 or F3. Additionally, further excavation to remove soil from the areas of contaminated samples is likely to affect the integrity of the permafrost across the site. Loss of integrity of the permafrost can result in ground subsidence,

decreasing integrity of reclaimed landscape design, and increased opportunity for erosion. In the screening level risk assessment report, GPRA recommended leaving the remaining PHCs in the ground in the Tank Farm area. Remaining contaminants in all other areas are expected to contribute negligible exposures to terrestrial ecological receptors and people accessing the site for recreational purposes.

REGULATORY AND GUIDANCE

The Mackenzie River Delta region is divided into various management jurisdictions, based on agreements negotiated in the Inuvialuit Final Agreement (ILA) in 1984. The region includes both Crown and private lands in the Inuvialuit Settlement Region (ISR). Resource and land management of the lands is under the responsibility of various co-management bodies, depending on the land ownership. Because Camp Farewell is situated in the Kendall Island Migratory Bird Sanctuary, it ultimately remains under Federal Crown authority; however, management and regulatory duties, in an operational context, are collaboratively shared with the Government of the Northwest Territories (GNWT) and Environment and Climate Change Canada (ECCC) under the Canadian Wildlife Service (CWS).

Thus, the contaminated site guidelines which are applicable to Camp Farewell include:

- GNWT Environmental Guideline for Contaminated Site Remediation (GNWT 2003)
- Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards for Petroleum Hydrocarbon Compounds, and associated documents (CCME 2008b, 2008a, 2008d, 2008c)

Other provincially-drafted and endorsed contaminated site guidance documents – specifically from Alberta, BC, and Ontario – were used, when appropriate, to fill regulatory data gaps.

GNWT guidelines allow site-specific risk assessments such as this one to develop site-specific target remediation levels for contaminants. Risk assessment guidance that was utilized for this purpose includes both human health risk assessment (HHRA) and ecological risk assessment (ERA), specifically those guidelines designated by Health Canada (Health Canada 2012) and Environment Canada (Environment Canada 2012a), as well as related guidance documents.

SITE-SPECIFIC RISK ASSESSMENT

This SSRA for Camp Farewell is intended to provide multiple *lines of evidence* delineating risks to humans and wildlife associated with the levels of petroleum hydrocarbons (PHCs) remaining in subsoil on the site.

The screening level risk assessment completed in 2017 (GPRA 2017) provided the initial screening based on concentration statistics in the areas of potential concern (APECs) on site, comparing these site statistics with the GNWT (GNWT 2003) and other Canadian regulatory

guideline values or associated effects-based concentrations; GPRA 2017 also provided the initial pathway evaluation and screening based on site characteristics.

This SSRA goes beyond the screening level of assessment to calculate the hazard quotients (HQ) and incremental lifetime cancer risk (ILCR) for relevant human and ecological receptors that may use the site area. Further, this SSRA calculates risk-based concentrations for benzene, toluene, xylenes, and F1 through F3, establishing the maximum threshold concentrations that can be considered safe for each of the ecological receptors that could have either direct dietary exposure to invertebrates and plants on the site, or to soil ingested incidentally during foraging.

The lines of evidence thus include:

- Chemical screening
- Pathway evaluation and screening
- Site-specific risk calculations for hypothetical exposure of human or wildlife receptors to subsoils on the site

Each of these examinations resulted in evidence that PHCs, VOCs, metals, and DDT present very low or negligible risks for human and wildlife receptors on the site.

Evaluations of these three lines of evidence are summarized in text boxes throughout this report.

General assumptions

Primary assumptions that were carried over from the previous assessment (GPRA 2017) include the following:

- Land use is designated as parkland
- Subsoil in this region is defined as soil deeper than 0.5 m below ground surface[1].

Data evaluation

Excavation and remediation depth

The qualitative screening level risk assessment (GPRA 2017) operated on the assumption that soil to a depth of 1.0 m would be excavated from most areas of the site, and that this soil would then be treated on-site to meet GNWT surface soil guidelines. While this assumption is still operable, the site data evaluated in this SSRA indicates that for the remaining contaminants on the site there is no risk-related advantage to excavating soil below the 0.6 m level.

[1] Various sources support the use of 0.5 m as a definition for subsoil in the Arctic region, of which the Mackenzie Delta area comprises a part: Leighton-Boyce, Batigelli, and Fraser 2012; INAC 2009; Komex 2003.

Maximum concentrations

From a risk perspective, evaluating human and ecological exposures to the 90th percentile BTEX compounds and PHC fractions provides a prudent worst-case exposure and risk evaluation. No receptor, whether human or wildlife, would spend all of its time at the precise location of a maximum concentration; therefore, it is unreasonable to base the SSRA on the maximum concentrations of the hydrocarbon contaminants.

The tank farm area has the highest concentrations of BTEX and PHCs. The borehole or confirmation samples showing the trend of the highest concentrations are: maxima at BH15-089 (F2 11,000 mg/kg) (Figure 4 in IEG 2016) and GS16-126 (F2 10,000 mg/kg) (Figure 4 in IEG 2017); other locations with higher F2 include BH15-085 and -086, with other locations in that same area accounting for the majority of higher PHC concentrations [2].

Targeted and localized excavation at these borehole and confirmation sites would be helpful in reducing possible potential as a future source for non-aqueous phase liquid condensation and potential exposure. CCME management limits based on potential condensation of hydrocarbons into free-phase liquids are targeted to less than 2% total PHCs in subsoil, with 1% as the total of F1–F3 (CCME 2008c). This percentage converts to 10,000 mg/kg F1-F3.

Further management limit calculations consider the potential for additional exposure or for additional effect pathways, including lower explosive limits and worker safety during trench work. However, it is highly unlikely that any such scenarios will occur on the Camp Farewell site; accordingly, condensation potential was considered to be the most critical factor. Adding a 2-fold safety factor to this calculation results in an effective subsoil management limit of 5000 mg/kg for combined F1-F3. This determination is consistent with previous discussion and guidance at Arctic contaminated sites (INAC 2009).

Toluene and F3

Toluene and F3 were detected at high concentrations in some samples from the airstrip, yet other BTEX compounds and F2 were not detected. Since toluene is not specifically more persistent than the other BTEX compounds, one would also expect to observe the other BTEX compounds above their detection limits if aviation fuel or diesel had been spilled at the location in question. By extension, the singular detections of toluene or F3 likely rule out the possibility of an aviation or diesel fuel spill.

The explanation for these elevated rates of toluene, then, lies in recent research that shows toluene can occur biogenically in peatlands and wetlands (Richards and Sandau 2018; Mayes and Luther 2015). We now understand that this phenomenon has resulted in unnecessary remediation at numerous sites in Canada.

[2] See Figures A and B in the Appendix for the figures excerpted from the 2016 and 2017 Camp Farewell site assessment reports.

PHC F3 is also recognized as naturally occurring in wetlands (Kelly-Hooper 2016; Kelly-Hooper et al. 2013), similarly to toluene. If F3 is reported, but F2 is not present – or F3 is high and F2 is very low – it is a good indicator that the detected F3 is of biogenic origin, not from a PHC spill.

Thus, evaluation of the Camp Farewell data suggests that it is likely that toluene and F3 detected in the airstrip samples are naturally occurring, and not the result of a fuel spill.

Individual samples from both the laydown / storage area and some parts of the tank-farm area also indicated a probable natural source for toluene and F3, due, again, to the absence of F2 or any other BTEX compounds. However, a worst-case mitigation approach was adopted in this SSRA; without the availability of data to confirm the presence of naturally occurring F3-like compounds, all data was included in the statistical evaluation of the PHCs and subsequent risk calculations.

AGAT Laboratories in Calgary has developed analytical techniques to evaluate whether toluene or F3 are of biogenic (peatland or wetland) or petrogenic (fuel) origin. Future analyses of this type could be undertaken to provide confirmation of the origin of these compounds. Further examination of the site assessment data, combined with confirmation of biogenic origin of the toluene or F3, could allow further refinement of the areas of the site that will require excavation.

Chemical screening

The evaluation of site data was initially performed during the screening level risk assessment for the site (GPRA 2017). Review of that data to evaluate for data gaps and generate improved interpretation was undertaken for this assessment. In order to test the hypothesis that excavating only to 0.6m would substantially increase the risk profile of the site, some data points were re-categorized for the statistical evaluation (i.e., the range of sample depth in the tank farm area was adjusted to 0.6 – 1.5m from the previously-used values of 1.0 – 3.0m). This resulted in minor changes to the PHC concentrations that were used for risk calculations, however, these adjustments did not result in changes that affected the risk interpretation and conclusions.

Chemicals are usually screened based solely on whether a single maximum value exceeds the most conservative (lowest) guideline. This results in very conservative screening that does not consider the operable exposure pathways, and guidelines that are pathway-based. Further, in calculating concentrations for risk assessment, using either the 90th percentile or the 95th upper confidence limit of the mean (95th UCL) is standard practice; the 90th percentile provides a sufficiently conservative exposure assessment, and is more conservative than the 95th UCL.

In the screening for Camp Farewell (see Table 1), the maximum concentration for each APEC was compared to the GNWT guideline for subsoil. F4, PAHs, PCBs, and metals other than barium did not exceed minimum guidelines. BTEX compounds, F1 – F3, and barium exceeded GNWT guidelines in at least one APEC: in a very conservative screening approach, these compounds would be carried forward as COPC. However, BTEX maxima did not exceed pathway-appropriate ecological direct contact guidelines, and the maximum barium concentration was below both the CCME human health soil contact guideline (9800 mg/kg) and the BC-MOE eco-soil contact guideline (1000 mg/kg). For F1 – F3 in the Tank Farm, the 90th percentile concentration of all data

points within the 0.6 – 1.5m range was below the subsoil eco-contact guidelines for GNWT, CCME, and AEP.

Line of evidence – Chemical screening

F4, PAHs, PCBs, DDT, and additional metals did not exceed the *de minimis* GNWT guidelines; BTEX and barium did not exceed eco-soil contact guidelines; F1 – F3 90th percentile concentrations did not exceed eco-soil contact guidelines. Based on pathway-appropriate guidelines, risks to ecological or human receptors would not be expected from contaminants in the subsoil at Camp Farewell.

In spite of the evidence in the screening stage that the contaminant concentrations (either maximum or 90th percentile) do not exceed pathway-appropriate guidelines, most of the compounds were quantitatively evaluated in the following sections of the SSRA.

Table 1. Screening table for site maxima and 90th percentile concentrations. Data have been rounded to two significant figures. Bold numbers exceed any guideline. Adopted from GPRA 2017

Compound	Subsoil Guidelines[1] (mg/kg)				Site Data (mg/kg)												COPC evaluation
					Shed (0.6-1.5m)		Airstrip (0.6-1.5m)		Laydown / Storage (0.6 - 1.5m)		Camp (0.6-1.5m)		Burn Pit (1.0-1.5m)		Tank Farm (0.6-1.5m)		Yes / No
	GNWT	GNWT (eco-soil contact)	CCME[4] AEP[6]	BC MOE	Maximum	90th percentile	Maximum	90th percentile	Maximum	90th percentile	Maximum	90th percentile	Maximum	90th percentile	Maximum	90th percentile	
Benzene	0.5		62 SQG_E		<0.005	<0.005	<0.005	<0.005	0.023	0.005	<0.005	<0.005	<0.005	<0.005	***3.3***	0.04	No. Max is > GNWT, but guideline is based on drinking water protection. Eco-soil contact is next most conservative.
Toluene	0.8		150 SQG_E		0.08	0.07	***53***	***3.1***	***8.0***	0.15	0.13	0.09	<0.05	<0.05	***20***	***2.0***	No. Max is > GNWT, but guideline is based on drinking water protection. Eco-soil contact is next most conservative.
Ethyl benzene	1.2		110 SQG_E		<0.01	<0.01	<0.01	<0.01	***3.5***	0.01	<0.01	<0.01	<0.01	<0.01	***15***	0.21	No. Max is > GNWT, but guideline is based on drinking water protection. Eco-soil contact is next most conservative.
Xylenes	1		190 SQG_E		<0.05	<0.05	<0.05	<0.05	***20***	0.05	<0.05	<0.05	0.1	0.07	***62***	***1.4***	No. Max is > GNWT, but guideline is based on drinking water protection. Eco-soil contact is next most conservative.
F1	230[2]	350			<10	<10	53	27	31	10	<10	<10	<10	<10	***1900***	10	No. Max F2 and F3 are > eco-soil contact guideline, but only a small fraction of tank farm samples (< 4%) exceeds guideline.
F2	150[2]	1500			<10	<10	<10	<10	***520***	10	<10	<10	48	25	***11000***	***700***	
F3		2500			<10	<10	1200	690	980	290	370	230	130	67	***3000***	1100	
F4		10000			13	12	830	490	520	170	160	100	60	35	1300	260	Not a COPC
Barium	500[3]		9800 SQG_{HH}	1000 SQG_E[5]	130	nc	340	320	***540***	240	170	150	130	120	na	na	No. Pathway elimination due to permafrost and remediation of surface soil; BC MOE SQG_E protective of any unlikely invertebrate or plant contact.
Other metals	1.0 - 200				No GNWT guideline exceedances												No
PAHs	0.7 - 10																No
PCBs	1.3																No
DDT	0.7																No

[1] (GNWT 2003)
[2] Soil quality guidelines for protection of freshwater aquatic life assuming surface water body 10m from site
[3] Barium interim soil quality guideline, CCME 1991 (CCME 2013, 1991)
[4] CCME (CCME 2004a, 2004c, 2004b, 2004d, 2013) subsoil quality guidelines that are not based on vapour exposure, drinking water, or groundwater for aquatic life criteria. SQG_E: ecological direct contact; SQG_{HH}: human direct contact
[5] BC MOE (BC MOE 2007) barium guideline for soil invertebrates and plants
[6] AEP (AEP 2016) subsoil guidelines for Natural Area Land Use that are not based on vapour exposure, drinking water, or groundwater for aquatic life criteria
nc = not calculated; na = not analyzed

List of compounds for SSRA

In order to quantitatively evaluate the risks to human and ecological receptors (i.e., the third line of evidence), the compounds listed in Table 2 were carried forward for risk calculations. Benzene, toluene, ethylbenzene, xylenes, and F1- F3 were evaluated.

Table 2. Exposure point concentrations of BTEX and PHC compounds used for the SSRA. All concentrations rounded to two significant figures.

COPC	90th percentile	Soil Mass Fraction	C_{soil}
	mg/kg	CCME 2008	mg/kg
Benzene	0.04	na	0.04
Toluene	2.0	na	2.0
Ethylbenzene	0.21	na	0.21
Xylenes	1.4	na	1.4
F1	10		
Aliphatics C_6-C_8		0.55	5.5
Aliphatics $C_{>8}$-C_{10}		0.36	3.6
Aromatics $C_{>8}$-C_{10}		0.09	0.9
F2	700		
Aliphatics $C_{>10}$-C_{12}		0.36	250
Aliphatics $C_{>12}$-C_{16}		0.44	310
Aromatics $C_{>10}$-C_{12}		0.09	63
Aromatics $C_{>12}$-C_{16}		0.11	77
F3	1100		
Aliphatics $C_{>16}$-C_{21}		0.56	620
Aliphatics $C_{>21}$-C_{34}		0.24	260
Aromatics $C_{>16}$-C_{21}		0.14	150
Aromatics $C_{>21}$-C_{34}		0.06	66

Pathway evaluation and assumptions

For a chemical compound to pose a risk to humans or wildlife, an exposure route or pathway must be present and operable. The following assumptions were used in assessing such exposure pathways for Camp Farewell.

- Groundwater is not considered an operable pathway via domestic use because of the seasonal and sometimes transient nature of groundwater in the active zone above permafrost, and because there is no demonstration of sufficient hydraulic conductivity to meet the criterion for domestic use in test wells at the site. Other water sources such as the river or smaller surface streams in the area would be used for drinking water by people accessing the site for traditional use or recreational purposes.
- Groundwater to surface water pathway is defined as not operable, because there are no surface water bodies within 30 m of the contaminated areas of the site. Remediation guidelines are often based on protection of freshwater aquatic life because this endpoint is the most sensitive and gives the lowest values. The next lowest risk-based values are eco-soil contact, which were used for compound screening in Table 1, above.
- Volatile hydrocarbon exposure is considered not operable and was not evaluated as part of the risk assessment: in a residential area this exposure would be calculated for homes with either a concrete basement or concrete slab-on-grade construction. However, because of the location and climate, it is unlikely that such a structure would be built on this site. (Permanent residences in the region are raised on pilings due to the permafrost). Seasonal, temporary residence on the site in tents or temporary shelters would not be expected to result in significant volatile hydrocarbon exposures due to a higher volume of air exchange with the outdoor ambient atmosphere and a small ground footprint (e.g., from a tent). The existing emergency shelter is situated on a confirmed clean edge of the lease area. Outdoor ambient exposure to volatiles could occur in theory; however, estimates for volatile transport from soil are based on significantly higher ground- and air temperatures than would be normally encountered on the Camp Farewell site, which would reduce volatilization from the subsoil.
- Country food (game or vegetation) was not considered a significant pathway for human receptors because PHCs (BTEX, F1, F2, F3, F4) do not bioaccumulate (magnify) in the food chain in the same way as some metals like mercury or persistent organic compounds such as PCBs, and also because vegetation accounts for a limited fraction of a country food diet. Nevertheless, a small fraction of hydrocarbons in soil can transfer into primary trophic media (invertebrates and foliage), and this has been considered when assessing low trophic level receptors such as insectivores and herbivores.

The SSRA was carried out using the assumption that all human and wildlife receptors could, at some point in the future, be exposed to the subsoil: exposure concentrations were determined from soil between 0.6 – 1.5 m depth, as was used for COPC screening in Table 1. A schematic summarizing the exposure pathways for human receptors on the site is provided (Figure 1). This is effectively a worst-case assessment; in reality, transfer of hydrocarbons from below 0.6 m to either the invertebrates or plant roots in the active soil layer is unlikely because >97% of soil inverts and root biomass are within the top 20 cm of soil (Leighton-Boyce, Batigelli, and Fraser 2012). It is also unlikely that human users or wildlife at the site would be exposed to the subsoil except in unusual or short-term circumstances.

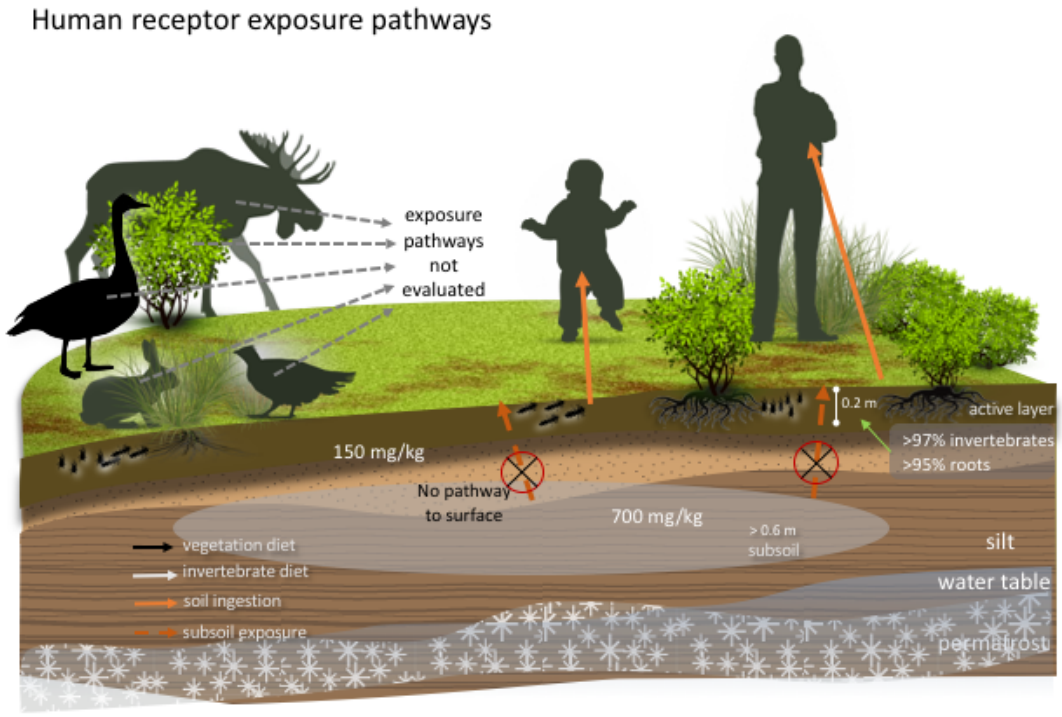

Figure 1. Human receptor exposure pathways. Soil was evaluated for incidental ingestion and dermal absorption. Other dietary sources such as game, foliage, and berries were not assessed: these sources would have minimal contribution to PHC exposure because of the non-bioaccumulative nature of PHCs or the small dietary contribution of the food source (e.g., medicinal tea).

Line of evidence – Pathway evaluation and screening

The results from the pathway evaluation and screening indicate risks would not be expected since exposure from soil is the final remaining operable pathway, yet the only matrix that contains residual hydrocarbons is the subsoil. Exposure via subsoil on the site is unlikely.

Receptors

The following assumptions guided the assessment of receptors:

- Regional residents may use the site for short stays during hunting trips; the future use scenario that was assessed includes use of the site for traditional activities, with people camping and occupying the site for the warmest three months of the year.
- For each of the avian and mammalian receptors, the assumption has been made that they hunt or forage only on the Camp Farewell site, even if some species (fox, Greater White-fronted Goose, Sandhill Crane) would have a substantially greater foraging range. This is a conservative assumption that results in over-estimating the risk. If the estimated risks using this assumption are below the level of concern, it is very unlikely the actual potential exposures to PHCs would pose a risk.
- Wildlife receptors were selected to represent the different consumption classes that are relevant for PHC exposure: insectivorous, herbivorous and omnivorous. Predatory birds such as owls, hawks, and falcons were not evaluated because of their large hunting ranges and the non-bioaccumulative nature of PHCs in the food chain. Larger mammals such as wolves, grizzly, and moose were not evaluated because of their large foraging and hunting ranges and the subsequently minor proportional area of the site contributing to their diet.

A conceptual model of the site (Figure 2) has been adapted from the screening level assessment (GPRA 2017). This model has been refined to reflect the wildlife receptors that are representative of different dietary classes (insectivorous, herbivorous, omnivorous) and are common to the region or observed on or near the Camp Farewell site.

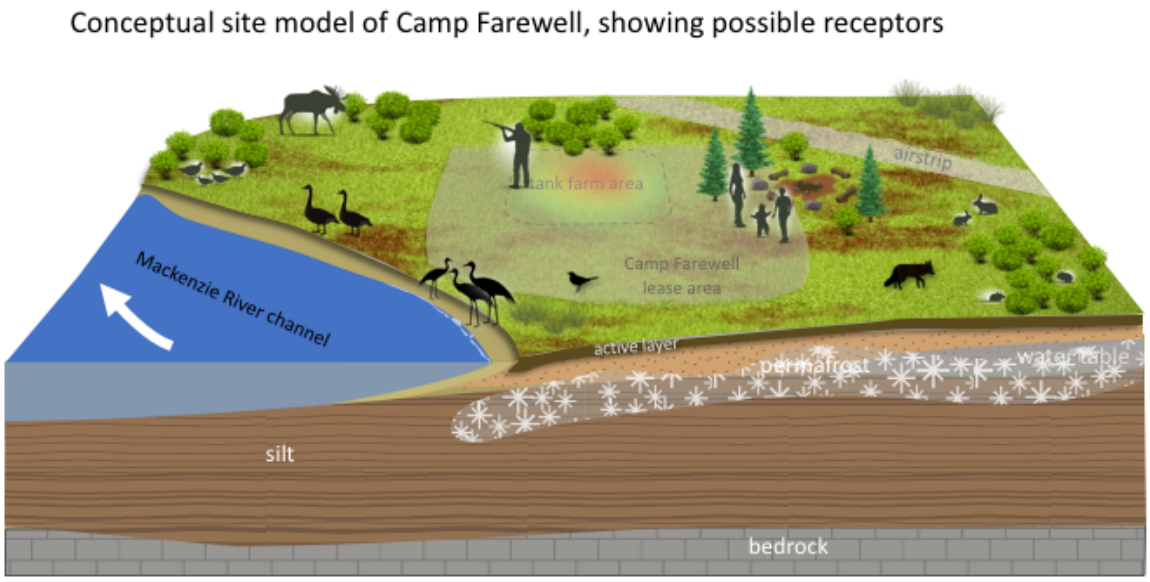

Figure 2. Conceptual model of the Camp Farewell site following remediation and reclamation. Receptors shown in the model are representative of potential human activities on the site, and the range of wildlife that may use or traverse the site. Note that while hunting may occur at the site, game is not considered to be a significant source of PHC exposure.

Human receptors

As discussed previously, Camp Farewell is on the main channel of the Mackenzie River in the delta region, approximately 100 km north of Inuvik. The site is well known to local groups. A temporary shelter on the site has been used by hunters and others, and Shell Canada Energy will consider leaving the shelter on the site for future emergency use if local hunter / trapper organizations or similar groups will assume ownership and responsibility. This shelter is situated at the south edge of the lease area, on soil/gravel that has been tested and shown to be uncontaminated.

For risk assessment purposes, the primary assumption is that the site could be utilized in the future for traditional uses including hunting, fishing and gathering, and that people would camp on the site while pursuing these activities. As established in the screening level risk assessment (GPRA 2017), additional assumptions are that no groundwater from the site will be used for drinking water, and that no residential structures will be built on either a basement or slab-on-grade

foundation. Any long-term structures, if such are ever built, would be raised on pilings because of the permafrost. Temporary structures, such as the emergency shelter, are generally wood frame construction with open space below the wood floor.

Typical receptors to evaluate in such a setting are toddlers and adults living on the site for the summer months. Depending on the contaminants of concern, a greater or lesser extent of country food consumption could be included in the assessment. In this case, however, on-site country food consumption was not included in the exposure calculations for two reasons: PHCs are not bioaccumulative, and only minimal quantities of leafy vegetation from the site would be used (e.g., mint or Labrador Tea for making beverages).

The parameters listed in Table 3 are standard values provided by Health Canada (Health Canada 2012). Recent large-scale risk assessments (CanNorth 2018; Suncor 2018) have used more current derivations of soil ingestion rates from Wilson (Wilson et al. 2013) and Richardson (Richardson and Stantec Consultants 2013), respectively. The Health Canada default values for incidental soil ingestion are 80 mg/d for toddlers and 20 mg/d for adults; more recently, these values were refined to 21 mg/d (toddlers) and 1.6 mg/d (adults) (Wilson et al. 2013) and 40 mg/d (toddlers) and 1.6 mg/d (adults) (Richardson and Stantec Consultants 2013). It is clear that the default values are significantly more conservative than these newer values. However, the assumption for Camp Farewell is that people using the site would be camping and primarily living outdoors during any stay on the site; therefore, the higher – and more conservative – ingestion rate for soil is considered reasonable and is adopted for this site-specific assessment.

Only characteristics for toddler (7 months to 4 years) and adult (20+ years) age groups are presented, as these are typically the most sensitive age groups for threshold-response COPC (i.e., non-carcinogens) and non-threshold COPC (i.e., carcinogens), respectively. Consequently, the risks calculated for these receptors tend to drive risk assessments; if acceptable risks are calculated for these receptors, other less sensitive age groups are also considered to be protected.

Table 3. Human receptor characteristics and exposure parameters

Physical Characteristics					
Parameter	**Acronym**	**Toddler**	**Adult**	**Units**	**Reference**
Age	-	7 mon - 4 yr	20+ yr	-	-
Body Weight	BW	16.5	70.70	kg	HC 2012
Soil Ingestion Rate	IR_S	0.00008	0.00002	kg/d	
Skin Surface Area - Hands	SA_H	430	890	cm^2	
Skin Surface Area - Arms + Legs	SA_O	2580	8220	cm^2	
Skin Surface Area - Whole Body	SA_T	6130	17640	cm^2	
Soil / Sediment Loading to Exposed Skin - Hands	SL_H	1.0E-07	1.0E-07	kg/cm^2/event	
Soil / Sediment Loading to Exposed Skin - Other	SL_O	1.0E-08	1.0E-08	kg/cm^2/event	
Absorption Factor from Gastrointestinal Tract	RAF_{Oral}	1	1	unitless	
Exposure Frequency and Duration					
Parameter	**Acronym**	**Value**	**Unit**	**Reference**	
Event Frequency	EF	1	events/d	assumed	
Hours per Day Exposed to Site	D_1	24	hr/24 hr	BPJ/HC 2012	
Days per Week Exposed to Site	D_2	7	d/7 d	BPJ/HC 2012	
Weeks per Year Exposed to Site	D_3	12	wk	BPJ/HC 2012	
Years of Site Exposure[a]	D_4	80	yr	HC 2012	
Life Expectancy[a]	LE	80	yr	HC 2012	

[a] Years of Site Exposure and Life Expectancy parameters are applicable for calculating incremental lifetime cancer risk.

[b] BPJ = best professional judgement

Terrestrial soil invertebrates and vegetation

Invertebrates and vegetation are the basis for the eco-soil contact guidelines for GNWT and CCME. These receptors were not specifically included in the SSRA for the following reasons:

- The 90th percentile concentrations of BTEX and PHC F1 – F3 are lower than GNWT or CCME guidelines based on eco-soil contact.
- Very small populations of soil invertebrates (< 3% of total population) and root biomass (< 5% of total root biomass) occur below 0.2 m (Leighton-Boyce, Batigelli, and Fraser 2012), and the population and biomass fractions decline steeply below this depth. At the 0.6 m depth at which the subsoil is being evaluated, we would expect very little invertebrate or root presence. In the unlikely event of invertebrate or root exposure below 0.6 m, hydrocarbon concentrations are less than guidelines (previous bullet).
- The basis for the CCME and GNWT eco-soil guidelines are toxicological studies on earthworms and crop species that are found in soil conditions reflective of southern latitude soil and climate parameters. While development of regionally appropriate eco-soil contact toxicity tests is being undertaken (Princz et al. 2012; Del Signore et al. 2016), currently available data are not specific to Arctic soils and organisms.

Avian receptors

Camp Farewell's location in the Kendall Island Migratory Bird Sanctuary (KIBS) (ECCC 2015) highlights the need to remediate the site so that no adverse effects occur to the many species of migratory waterfowl and shorebirds that use the area for breeding and nesting.

No species listed in the Canadian Species at Risk Act (SARA) are known to frequent the site area. The species chosen for the SSRA represent ranges of size and diets, focused on terrestrial food sources. The final reclaimed site will be surface graded to ensure surface water drainage, therefore the assumption is that seasonal or ephemeral surface water bodies will not be present and the opportunity for aquatic invertebrate exposure to remaining contaminants will be mitigated. Further, shore birds that thrive on such an ecosystem were not evaluated – e.g. sandpipers, phalaropes, and dowitchers.

American Robin

The American Robin (Turdus migratorius) (Table 4) is an abundant bird across North America (Audubon 2014a). It has a relatively small foraging range, particularly while breeding and nesting. Its diet is primarily invertebrates and fruit (vegetation). It has a high food-ingestion rate to body-weight ratio, and a relatively high percentage of inadvertent soil ingestion, both of which make it more susceptible to contaminant exposures from soil. For the current exposure calculations, the vegetation portion of its diet was conservatively evaluated as foliage.

Table 4. American Robin receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	0.08	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.03	Calculated from wet weight ingestion, assuming 70% moisture
Food ingestion rate - wet weight	IR_{ww}	kg/d	0.1	Wet weight ingestion rate = 1.2*BW
Soil ingestion rate	IR_s	kg/d	0.0052	From EC 2012: 8.2% of dry weight food ingestion (Environment Canada 2012b)
Foraging range	R	km^2	0.005	From EC 2012. Small foraging range (Environment Canada 2012b), and assumption is that all foraging is onsite at Camp Farewell
Diet - omnivore				
Terrestrial invertebrates	f_{inv}	unitless	0.5	From EC 2012 (Environment Canada 2012b). Earthworms are the most important food in many regions; however, worms are not generally present in the Mackenzie Delta region. It is assumed that other invertebrates are substituted in the North and are a major portion of the diet until berries ripen later in the summer. This SSRA adjusted the diet proportions from 40% invertebrates / 60% berries (EC 2012) to a 50% / 50% ratio to account for more invertebrate consumption.
Foliage or vegetation	f_{veg}	unitless	0.5	

Willow Ptarmigan

The Willow Ptarmigan (Lagopus lagopus) (Table 5) is a common non-migratory game bird (grouse) in the North (Audubon 2014d). It often lives in willow shrubs on the tundra. It is almost entirely vegetarian; in this assessment, it has been conservatively evaluated as consuming 100% foliage, rather than a combination of berries, twigs and foliage.

Table 5. Willow Ptarmigan receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	0.65	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.04	Based on allometric equation for all birds: $IR_{dw} = 0.0582*BW^{0.651}$ (EPA 1993)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0. 14	Calculated from dry weight ingestion, assuming 70% moisture
Soil ingestion rate	IR_s	kg/d	0.0087	9.3% of dry weight food ingestion, based on wild turkey (Beyer, Connor, and Gerould 1994)
Foraging range	R	km^2	na	Conservative estimate is that all foraging is onsite at Camp Farewell
Diet - herbivore				
Terrestrial invertebrates	f_{inv}	unitless	0	Adult birds are almost entirely vegetarian, eating buds, twigs, leaves and seeds from willow, alder, birch and other plants (Audubon 2014d)
Foliage or vegetation	f_{veg}	unitless	1.0	

Greater White-fronted Goose

The Greater White-fronted Goose (Anser albifrons) (Table 6) is one of the key species of the KIBS and is evaluated here as a representative migratory waterfowl observed on the Mackenzie River at Camp Farewell. Other goose species that are prevalent in the KIBS include the Black Brant (Branta bernicla) and the Lesser Snow Goose (Anser caerulescens). Anecdotal evidence from Indigenous communities indicates that people use the Camp Farewell area as a staging area for goose hunting, and that flocks of geese are observed on the sand bars on the river. The key assumption made for the geese is that they would spend their foraging time on the Camp Farewell site, consuming terrestrial invertebrates and terrestrial grasses and sedges, rather than feeding on aquatic species on or near the water. This is a conservative assumption that will result in over-estimating the levels of PHC exposure.

Table 6. Greater White-fronted Goose receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	2.5	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.11	Based on allometric equation for all birds: $IR_{dw} = 0.0582*BW^{0.651}$ (EPA 1993)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0. 35	Calculated from dry weight ingestion, assuming 70% moisture
Soil ingestion rate	IR_s	kg/d	0.0087	From Beyer et al 1994: 8.2% of dry weight food ingestion, based on Canada Goose (Beyer, Connor, and Gerould 1994)
Foraging range	R	km^2	na	Conservative estimate is that all foraging is onsite at Camp Farewell
Diet - herbivore				
Terrestrial invertebrates	f_{inv}	unitless	0.2	Summer grazing diet is stems and roots of grasses, sedges, horsetail and other plants, with a few invertebrates; for Camp Farewell conservatively estimated to be 20% of diet (Audubon 2014b)
Foliage or vegetation	f_{veg}	unitless	0.8	

Sandhill Crane

The Sandhill Crane (Antigone canadensis) (Table 7) is a large migratory crane that breeds and nests in the arctic regions (Audubon 2014c). It is an omnivorous species and will eat small rodents, amphibians, nestling birds, invertebrates and vegetation. Based on differing observations of Sandhill Crane diet in different locations (see Table 7), the risk calculations of this assessment assumed 80% terrestrial invertebrates and 20% terrestrial vegetation. This ratio provides a conservative (high) estimate of PHC exposure. This approach is more conservative than if small mammals were included in the diet because PHCs do not biomagnify up the food chain, and would become less concentrated with each step up the trophic chain.

Local residents have said they observe the cranes alongside the geese on sandbars on the river near the Camp Farewell site.

Table 7. Sandhill Crane receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	2.5	Average value from Environment Canada 2012b
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.11	Based on allometric equation for all birds: $IR_{dw} = 0.0582*BW^{0.651}$ (EPA 1993)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0. 35	Calculated from dry weight ingestion, assuming 70% moisture
Soil ingestion rate	IR_s	kg/d	0.0087	From Beyer et al 1994: 8.2% of dry weight food ingestion, based on Canada Goose (Beyer, Connor, and Gerould 1994)
Foraging range	R	km^2	na	Conservative estimate is that all foraging is onsite at Camp Farewell
Diet - omnivore				
Terrestrial invertebrates	f_{inv}	unitless	0.80	Diet varies widely with location and season, and includes grains, vegetation, invertebrates, as well as rodents, amphibians and small birds. (Audubon 2014c). Mallory (Mallory 1987) observed Sandhill Cranes on the tundra eating lichens and old growth vegetation, lemmings, goose eggs, ptarmigan hatchlings, and goose carcasses left by foxes. Davis and Vohs (Davis and Vohs 1993) observed spring-time diets of 89% macroinvertebrates (beetles) and 11% plants. Based on these sources, and to provide a conservative estimate of risk, this assessment has set invertebrate consumption at 80% and vegetation at 20%.
Foliage or vegetation	f_{veg}	unitless	0.20	

Of the many species of migratory waterfowl and shorebirds in the Kendall Island Migratory Bird Sanctuary, the Greater White-fronted Goose and the Sandhill Crane were selected to represent species that are more likely to forage on land, rather than exclusively in wetlands and on the water. This selection has the effect of biasing the dietary designation toward terrestrial invertebrates and foliage; risk estimates that result from this intentionally-introduced bias are accordingly rendered more conservative (high). If even these estimates of risk remain low, it is unlikely that the varied diets which actually represent the diversity of avian species in the area would result in exposure to PHCs that could cause adverse effects.

Mammals

Masked Shrew

The Masked Shrew (Sorex cinereus) (Table 8) is an insectivorous rodent that spends significant time in tunnels and tracks among decayed vegetation, leaves, mosses and other detritus. They forage for insects in a small home range, and typically eat the equivalent of their own body weight of food each day.

Table 8. Masked Shrew receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	0.004	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.0015	Allometric equation for rodents. $IR_{dw} = 0.621*BW^{0.564}$ (EPA 1993; Environment Canada 2012b)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0.005	Assume 70% moisture content and applied to dry weight ingestion rate
Soil ingestion rate	IR_s	kg/d	0.000036	Assumed the same soil ingestion as meadow vole (Beyer, Connor, and Gerould 1994): 2.4% of dry weight food ingestion
Foraging range	R	km^2	0.006	From EC 2012 (Environment Canada 2012b)
Diet - insectivore				
Terrestrial invertebrates	f_{inv}	unitless	0.95	General categorization between invertebrates and "other" (Environment Canada 2012b); for this assessment, "other" is conservatively considered to be foliage
Foliage or vegetation	f_{veg}	unitless	0.05	

Arctic Hare

The Arctic Hare (Lepus arcticus) (Table 9) is widespread in the North and is a favoured prey of the fox and wolf. Its diet is mostly woody plants, which for this assessment are conservatively assumed as equivalent to foliage.

Table 9. Arctic Hare receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	1.3	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.082	Calculated from 0.06 kg dry food/BW/d (Environment Canada 2012b)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0.27	Assume 70% moisture content and applied to dry weight ingestion rate
Soil ingestion rate	IR_s	kg/d	0.0052	6.3% of dry weight food ingestion for jackrabbit (Environment Canada 2012b)
Foraging range	R	km^2	0.05	(Environment Canada 2012b)
Diet - herbivore				
Terrestrial invertebrates	f_{inv}	unitless	0	From EC 2012 (Environment Canada 2012b)
Foliage or vegetation	f_{veg}	unitless	1.0	

Red Fox

The Red Fox (Vulpes vulpes) (Table 10) is a well-known and common canid species in the Arctic. It is primarily a carnivore but it will consume vegetation. Foxes can have substantial home ranges, so the assumption used in this assessment – that all insect and vegetation consumed would originate solely from the Camp Farewell site – is very conservative.

Table 10. Red Fox receptor parameters

Parameter	Acronym	Units	Value	Reference
Body weight	BW	kg	3.8	Average value (Environment Canada 2012b)
Food ingestion rate - dry weight	IR_{dw}	kg/d	0.1	Calculated from 0.06 kg dry food/BW/d (Environment Canada 2012b)
Food ingestion rate - wet weight	IR_{ww}	kg/d	0.34	Assume 70% moisture content and applied to dry weight ingestion rate
Soil ingestion rate	IR_s	kg/d	0.0052	2.8% of dry weight food ingestion (Beyer, Connor, and Gerould 1994; Environment Canada 2012b)
Foraging range	R	km^2	na	Range varies from 2.8 to >30 km^2; however, conservative assumption is that all foraging is onsite at Camp Farewell
Diet - omnivore				
Terrestrial invertebrates	f_{inv}	unitless	0.25	General categorization of invertebrate and vegetation (Environment Canada 2012b). Small mammals and birds make up the remaining 40% and 20%, respectively, of the fox diet. Because PHCs do not bioaccumulate in the food chain, only first order food groups are considered.
Foliage or vegetation	f_{veg}	unitless	0.15	

Larger mammals, including ungulates (moose and caribou) and predatory species (wolf and grizzly), were not evaluated. Although moose and grizzly have been observed on or near Camp Farewell, their large hunting and foraging ranges mean that food sources found on the site would comprise only a very small portion of these species' diets.

Toxicological parameters

Human receptors

Toxic reference values (TRVs) used in the human receptor risk calculations are provided in Table 11. Toxicity studies of representative chemicals (either individually or as limited mixtures) within the representative carbon-chain ranges for the PHC fractions were compiled and reviewed. TRVs were developed for the aromatic and aliphatic fractions by the Total Petroleum Hydrocarbon Working Group (CCME 2008d).

Ecological receptors

TRVs for avian and mammalian ecological receptors are listed in Table 12 and Table 13. PHC toxicity parameters were developed from studies on cattle and ducks using whole crude oil. Relative toxicity values for each fraction were derived from the analyses of F1 through F4 fraction percentages of crude oil as provided in the CWS-PHC (CCME 2008d).

Table 11. Human health toxic reference values (mg/kg-d)

COPC	Toxic reference value (mg/kg-d)		Oral slope factor $(mg/kg\text{-}d)^{-1}$	Source
	Toddler	Adult		
Benzene	0.006	0.006	0.08	(EPA 2002; Health Canada 2010)
Toluene	0.22	0.22		(Health Canada 2010)
Ethylbenzene	0.1	0.1		(Health Canada 2010)
Xylenes	1.5	1.5		(Health Canada 2010)
F1	fraction dependent	fraction dependent		Based on hepatic and hematological changes in rat studies (CCME 2008d)
Aliphatics C_6-C_8	5	5		
Aliphatics $C_{>8}$-C_{10}	0.1	0.1		
Aromatics $C_{>8}$-C_{10}	0.04	0.04		
F2	fraction dependent	fraction dependent		
Aliphatics $C_{>10}$-C_{12}	0.1	0.1		
Aliphatics $C_{>12}$-C_{16}	0.1	0.1		
Aromatics $C_{>10}$-C_{12}	0.04	0.04		
Aromatics $C_{>12}$-C_{16}	0.04	0.04		
F3	fraction dependent	fraction dependent		
Aliphatics $C_{>16}$-C_{21}	2	2		
Aliphatics $C_{>21}$-C_{34}	2	2		
Aromatics $C_{>16}$-C_{21}	0.03	0.03		
Aromatics $C_{>21}$-C_{34}	0.03	0.03		

Table 12. Toxic reference values (mg/kg-d) for avian receptors

COPC	Avian TRV	Reference
Benzene	1.1	No avian toxicology studies were found for the BTEX compounds; therefore, an average relative toxicity factor was calculated from F1 through F4 for the mammal to avian TRVs. The avian TRV is approximately 0.6 of the mammalian TRV (Table 13), which is supported by a general consensus that birds are more sensitive to toxic effects than are mammals. The avian TRVs for benzene, toluene, and xylenes were estimated by multiplying the corresponding mammal TRV by 0.6.
Toluene	14	
Ethylbenzene	17	
Xylenes	22	
F1	28	Based on a study of Mallard Ducks exposed to South Louisiana Crude oil in feed for 26 weeks (Coon and Dieter 1981). Observed reduced egg production and effects in the oviduct; effects threshold in the study was 1200 mg/kg-d. An uncertainty factor of 10 was applied to this factor to arrive at the avian TRV of 120 mg/kg-d. The same fraction percentages as used for the mammalian TRV derivation were used here.
F2	26	
F3	41	
F4	22	

Table 13. Toxic reference values (mg/kg-d) for mammalian receptors

COPC	Mammal TRV	Reference
Benzene	1.8	Based on hematologic effects in rats and mice (EPA 2002); adjusted LOAEL was 18 mg/kg-d and an uncertainty factor of 10 was applied
Toluene	24	Based on kidney weight changes in male rats (EPA 2005); benchmark dose was 238 mg/kg-d and an uncertainty factor of 10 was applied
Ethylbenzene	29	Based on liver and kidney toxicity in rats ((EPA 1987); benchmark dose was 291 mg/kg-d and an uncertainty factor of 10 was applied.
Xylenes	36	Based on body weight and mortality effects in mice (EPA 2003); adjusted LOAEL was 360 mg/kg and an uncertainty factor of 10 was applied
F1	49	Based on threshold dose estimates for cattle via ingestion of crude oil in water - , Appendix I). The effect threshold was set at 2100 mg/kg-d, and an uncertainty factor of 10 was applied to arrive at the TRV of 210 mg/kg-d for crude oil. TRVs were calculated for each fraction [3], based on an assumption that the crude oil used in the cattle study was similar to the fresh Federated Crude Oil analyzed for fraction percentages.
F2	45	
F3	72	
F4	38	

[3] The assumption implicit in this calculation of the TRV from the percentage of each fraction in the fresh crude is that the toxic response is equal throughout the range of chemicals in the fractions. As discussed in CCME 2008 (CCME 2008d), F3 and particularly F4 are unlikely to contribute linearly to the toxicity response of the crude oil, primarily because, "the bioavailability and gastrointestinal absorption of petroleum hydrocarbons greater than C16 is expected to be limited" (p. 367).

The TRVs calculated for mammals and avian species based on these numbers are likely quite conservative, meaning they result in over-estimating risks from exposure to PHC fractions, rather than underestimating such risks.

Exposure parameters and equations

The soil and food intake algorithms presented in the Health Canada document, "Federal Contaminated Site Risk Assessment in Canada Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA)" (HC, 2009) were used to quantify chemical intakes. These intake algorithms are presented below.

Equation for inadvertent soil ingestion:

$$Dose(mg/kg/day) = \frac{C_S * IR_S * RAF_{Oral} * D_2 * D_3 * D_4}{BW * LE}$$

Where:

- C_S = Concentration of COPC in Soil (mg/kg)
- IR_S = Receptor Soil Ingestion Rate (mg/day)
- RAF_{Oral} = Relative Absorption Factor from the GI tract (unitless)
- D_2 = Exposure Frequency (days per week exposed/7 days)
- D_3 = Exposure Duration (weeks exposed/weeks on site)
- D_4 = Years of Exposure (total years exposed to the site – employed for assessment of carcinogens only)
- BW = Body Weight (kg)
- LE = Life Expectancy (years – employed for assessment of carcinogens only)

Equation for dermal absorption from contaminated soil:

$$Dose(mg/kg/day) = \frac{[(C_S * SA_H * SL_H) + (C_S * SA_O * SL_O)] * RAF_{Derm} * D_2 * D_3 * D_4}{BW * LE}$$

Where:

- C_S = Concentration of COPC in Soil / Sediment (mg/kg)
- SA_H = Surface Area of Hands Exposed for Soil / Sediment Loading (cm^2)
- SA_O = Surface Area Exposed Other than Hands (cm^2)
- SL_H = Soil / Sediment Loading Rate to Exposed Skin of Hands (kg/cm^2-event)
- SL_O = Soil / Sediment Loading Rate to Exposed Skin Other than Hands (kg/cm^2-event)
- RAF_{Derm} = Relative Dermal Absorption Factor (unitless) (See Table 14)
- D_2 = Exposure Frequency (days per week exposed/7 days)
- D_3 = Exposure Duration (weeks exposed/weeks on site)

D_4 = Years of Exposure (total years exposed to the site – employed for assessment of carcinogens only)
BW = Body Weight (kg)
LE = Life Expectancy (years – employed for assessment of carcinogens only)

Relative absorption factors for dermal exposures are provided in Table 14.

Table 14. Chemical specific relative dermal absorption factors used for human receptor exposure calculations

COPC	RAF_{Derm} (unitless)	Reference
Benzene	0.03	(Health Canada 2010)
Toluene	0.03	
Ethylbenzene	0.03	
Xylenes	0.03	
F1		
Aliphatics C_6-C_8	0.2	
Aliphatics $C_{>8}$-C_{10}	0.2	
Aromatics $C_{>8}$-C_{10}	0.2	
F2		
Aliphatics $C_{>10}$-C_{12}	0.2	
Aliphatics $C_{>12}$-C_{16}	0.2	
Aromatics $C_{>10}$-C_{12}	0.2	
Aromatics $C_{>12}$-C_{16}	0.2	
F3		
Aliphatics $C_{>16}$-C_{21}	0.2	
Aliphatics $C_{>21}$-C_{34}	0.2	
Aromatics $C_{>16}$-C_{21}	0.2	
Aromatics $C_{>21}$-C_{34}	0.2	

Receptor characteristics, exposure frequency and duration assumptions are based on information provided by Health Canada (HC 2009b), data presented by Wein et. al (1991), and by best professional judgment developed from a combination of Health Canada, Wein et al., and problem formulation considerations, as appropriate.

Body weights, ingestion rates, and other exposure parameters for each of the human and ecological receptors are provided in Table 3 through Table 10.

Exposure equations for ecological receptors are somewhat simplified in comparison to the human exposure equations: for all compounds, bioavailability and bioaccessibility are assumed to be 100%, and the assumption is made that dermal transfer from soil to receptor is insignificant

because of fur or feathers covering the majority of the skin surface. Therefore, only the ingestion route is calculated.

Because invertebrates or plants make up the majority of the diet for receptors being evaluated, it is important to account for the transfer of BTEX and PHC fractions from soil to the primary food sources. While these compounds are considered non-bioaccumulative – i.e., they do not become successively more concentrated as they are carried up the food chain – there is some transfer to primary foliage and invertebrates (Table 15).

Table 15. Bioconcentration factors (BCF) (unitless) for soil to plants and soil to invertebrates. BCFs are used for avian and mammalian exposure calculations.

COPC	Log K_{ow}	Plant BCF	Invertebrate BCF
		$Soil_{dw}$ to $plant_{ww}$	$Soil_{dw}$ to $invertebrate_{ww}$
Benzene	2.09	2.4	0.19
Toluene	2.57	1.3	0.19
Ethylbenzene	3.11	0.62	0.19
Xylenes	3.13	0.6	0.19
F1	4.27	0.13	0.19
F2	5.98	0.014	0.19
F3	9.35	0.00015	0.19

The plant BCF is based on log BCF_{plant} = 1.588 – 0.578(log K_{ow}) from Travis and Arms 1988 (Travis and Arms 1988). The invertebrate BCF is based on BCF_{invert} = L / 0.66 x f_{oc} (where L = fraction of lipid in earthworm; f_{oc} = fraction of organic carbon in soil). Assume L = 0.02; f_{oc} = 0.01. Based on Menzie (Menzie et al. 1992).

Risk characterization

Human health

Risk of non-cancer health effects is most often characterized as a ratio, termed a hazard quotient (HQ); this quotient is arrived at by dividing the estimated daily intake or dose of a compound by the tolerable daily intake, or reference, dose. Health Canada's guidance when calculating the HQ for partial exposure sources, recognizing an inability to account for all possible routes including background exposures, is that a benchmark HQ of 0.2 should be used (Health Canada 2012). If, however, all exposure routes and mechanisms can be accounted for, then a benchmark HQ of 1.0 is appropriate.

For cancer-causing compounds, such as benzene, the incremental lifetime cancer risk (ILCR) is estimated by multiplying the estimated daily intake of the compound by the cancer slope factor. Health Canada's policy-based benchmark is 1 x 10^{-5} (or 1 case in 100,000) as a lifetime risk of developing cancer from exposure to the compound.

In the case of people using the Camp Farewell site in the future, this SSRA establishes that exposure to hydrocarbons in the subsoil via incidental ingestion and dermal contact is not likely

to result in added risks of adverse health effects: all HQs for toddler and adult receptors are well below the benchmark of 0.2, and the ILCR for benzene is approximately 3000 times below Health Canada's negligible risk level.

Table 16. Hazard quotients and incremental cancer risk to human receptors exposed to soil on the Camp Farewell site. The reference HQ and ILCR are 0.2 and 1 x 10^{-5} respectively; values below these are considered to present negligible risks.

COPC	HQ - Soil = $HQ_{SoilIng}$ + $HQ_{SoilDerm}$	ILCR - Soil = $ILCR_{SoilIng}$ + $ILCR_{SoilDerm}$
TODDLER		
Benzene	0.00009	na
Toluene	0.00006	
Ethylbenzene	0.00001	
Xylenes	0.00001	
F1	0.0003	
F2	0.05	
F3	0.04	
ADULT		
Benzene	0.000007	3 x 10^{-9}
Toluene	0.000004	na
Ethylbenzene	0.0000008	
Xylenes	0.000001	
F1	0.00005	
F2	0.007	
F3	0.006	

$HQ_{SoilIng}$ = Hazard quotient from ingested soil
$HQ_{SoilDerm}$ = Hazard quotient from dermal absorption of contaminants from soil

Avian

The results of risk calculations for the avian receptors (Table 17) show that for ptarmigan, geese, or cranes there would be no expected risks from exposures to BTEX or PHCs, even in the unlikely scenario of being exposed to subsoil from the tank farm area. For the robin, calculations indicate that estimated exposures to F2 and F3 in the subsoil could exceed risk-based dose amounts because of the higher food intake rate which means the robin is essentially eating the equivalent of its body weight each day. Yet the likelihood of the exposures occurring to this extent is remote; it exists only in the case that robins could be exposed directly to the subsoil, combined with being confined to the area of the highest concentrations in the tank farm area. Consequently, it is unlikely that robins would be affected by PHCs.

Table 17. Estimated total daily intake (TDI) and calculated hazard quotient (HQ) for avian receptors. Bold numbers exceed any guideline.

Chemical	American Robin		Willow Ptarmigan		Greater White-fronted Goose		Sandhill Crane	
	TDI	HQ	TDI	HQ	TDI	HQ	TDI	HQ
	mg/kg-d	unitless	mg/kg-d	unitless	mg/kg-d	unitless	mg/kg-d	unitless
Benzene	0.1	0.06	0.02	0.02	0.01	0.01	0.00	0.08
Toluene	2	0.13	0.59	0.04	0.31	0.02	0.10	0.05
Ethylbenzene	0.1	0.01	0.03	0.002	0.02	0.001	0.01	0.04
Xylenes	1	0.03	0.19	0.01	0.11	0.00	0.05	0.03
F1	2	0.08	0.35	0.01	0.23	0.01	0.24	0.02
F2	110	**4**	6.4	0.2	7.2	0.3	14	0.02
F3	150	**4**	6.4	0.2	9.2	0.2	21	0.02

Calculated risk-based tolerable concentrations of BTEX and PHCs in soil (Table 18) for the birds provide more context for the HQ values shown in the previous table. Apart from the robin, birds can tolerate relatively high concentrations of hydrocarbons in soil before they would be exposed to sufficient amounts to potentially cause health effects.

Table 18. Risk-based tolerable concentrations of PHCs in soil for different bird species, compared to existing or planned concentrations on site. All concentrations rounded to two significant figures.

Chemical	American Robin	Willow Ptarmigan	Greater White-fronted Goose	Sandhill Crane	Subsoil (tank farm area)	Surface*
	risk based tolerable concentration in soil				90th percentile	
	mg/kg				mg/kg	mg/kg
Benzene	1	2	4	14	0.1	0.5
Toluene	16	49	93	280	3	0.8
Ethylbenzene	34	120	220	500	0.2	1.2
Xylenes	43	160	280	630	4	1
F1	130	800	1200	1200	10	130
F2	170	2800	2500	1200	750	150
F3	290	6600	4600	2000	1000	400

*surface soil is targeted to meet GNWT Guidelines

Mammals

The results of risk calculations for the mammalian receptors (Table 19) show that for the hare and fox there would be no expected risks from exposures to BTEX or PHCs, even in the unlikely scenario of being exposed to subsoil from the tank farm area.

For the Masked Shrew, calculations indicate that estimated exposures to F2 and F3 in the subsoil could exceed risk-based dose amounts. The Masked Shrew is a small mammal with a high metabolic rate and a daily food intake that exceeds its body weight. This puts these shrews into a higher susceptibility range due to increased relative exposure. As is the case for the robin, there are safety factors inherent within the exposure and risk calculations for the shrew, and it is unlikely this mammal would experience adverse effects from dietary exposure. Additionally, the likelihood of the exposures even occurring to this extent is remote; finally, factoring in the limited area of the highest concentrations in the tank farm area, it is unlikely shrews would be affected by PHCs.

Table 19. Estimated total daily intake (TDI) and hazard quotient (HQ) for mammalian receptors. Bold numbers exceed any guideline.

Chemical	Masked Shrew		Arctic Hare		Red Fox	
	TDI	HQ	TDI	HQ	TDI	HQ
	mg/kg-d	unitless	mg/kg-d	unitless		
Benzene	0.02	0.01	0.02	0.01	0.002	0.001
Toluene	1	0.03	0.55	0.02	0.05	0.002
Ethylbenzene	0.1	0.002	0.03	0.001	0.003	0.0001
Xylenes	0	0.01	0.18	0.01	0.02	0.001
F1	2	0.05	0.31	0.01	0.07	0.001
F2	160	**4**	4.8	0.11	4	0.08
F3	240	**3**	4.2	0.06	5	0.07

Calculated risk-based tolerable concentrations of BTEX and PHCs in soil (Table 20) for the mammals provide more context for the HQ values shown in the previous table. Apart from the shrew, the mammals can tolerate relatively high concentrations of hydrocarbons in soil before they would be exposed to sufficient amounts to cause health effects.

Table 20. Risk-based tolerable concentrations of PHCs in soil for various mammals, compared to existing or planned concentrations on site. All concentrations rounded to two significant figures.

Chemical	Masked Shrew	Arctic Hare	Red Fox	Subsoil (tank farm area)	Surface*
	tolerable concentration in soil			90th percentile	
	mg/kg-d			mg/kg	mg/kg
Benzene	5	4	48	0.1	0.5
Toluene	76	88	1100	3	0.8
Ethylbenzene	110	220	2200	0.2	1.2
Xylenes	130	280	2800	4	1
F1	200	1600	7300	10	130
F2	190	6500	8700	750	150
F3	310	18000	14000	1000	400

*surface soil is targeted to meet GNWT Guidelines

Line of evidence – Risk assessment

The results of the quantitative SSRA indicate that humans and wildlife using the Camp Farewell site are not expected to experience any risks of adverse health effects due to residual hydrocarbon contaminants in the subsoil.

CONCLUSIONS

The site-specific risk assessment of hydrocarbon contamination on the Camp Farewell site included assessment of multiple lines of evidence related to chemicals of concern, pathways of potential exposure, and quantitative calculation of hazard quotients and species-specific tolerable hydrocarbon concentrations in soil. Risks were assessed using a worst-case assumption that humans and wildlife could be chronically exposed to subsoil on the site at some point in the future.

The SSRA concludes that:

- Chemical screening using site characterization data indicated that BTEX compounds and PHCs in subsoil are below pathway-specific guidelines from both GNWT and CCME.
- Removal of material below 0.6 m is not required to reduce risks to below acceptable levels. There is no additional risk benefit to excavating site areas to 1.0 m or more.
- Toluene and F3 can form biogenically in wetlands / peatlands. If F2 or other BTEX compounds are not present, it is probable that toluene and F3 are naturally occurring in the airstrip samples and in other samples taken from the lease areas. Therefore, excavation of these areas based on toluene or F3 guideline exceedances is not recommended. Confirmation analyses can be obtained through AGAT Laboratories in Calgary.
- Maximum concentration "hotspots" of PHC fractions in subsoil may be removed to avoid future condensation to liquid phase, specifically in the areas of BH15-089 and GS16-126. A 5000 mg/kg management limit for F1-F3 in subsoil is considered to be protective from this perspective.
- Exposure pathway assessment resulted in the finding of oral and dermal soil exposure as the relevant human receptor; wildlife receptors are primarily exposed via direct soil ingestion and dietary intake from terrestrial invertebrates and vegetation.
- Quantitative SSRA results indicate human receptors would be well below Health Canada thresholds for adverse risks if exposed to hydrocarbons in the subsoil. HQs ranged from 0.00001 to 0.05 for toddlers. Health Canada's benchmark is HQ = 0.2.
- Birds accessing the site either year-round (ptarmigan) or for breeding and nesting (robin, goose, crane) are not at risk from hydrocarbon exposure. Results indicate an avian HQ of < 1.0 for all species, except in the case of the robin, where calculations for F2 and F3 show HQs of 4. However, given the safety factors built into the exposure and risk calculations, it is unlikely that robins or similar species would experience adverse effects in any case. Figure 3 shows the operable pathways of exposure for the representative avian species, and gives the calculated tolerable F2 concentrations for each species.

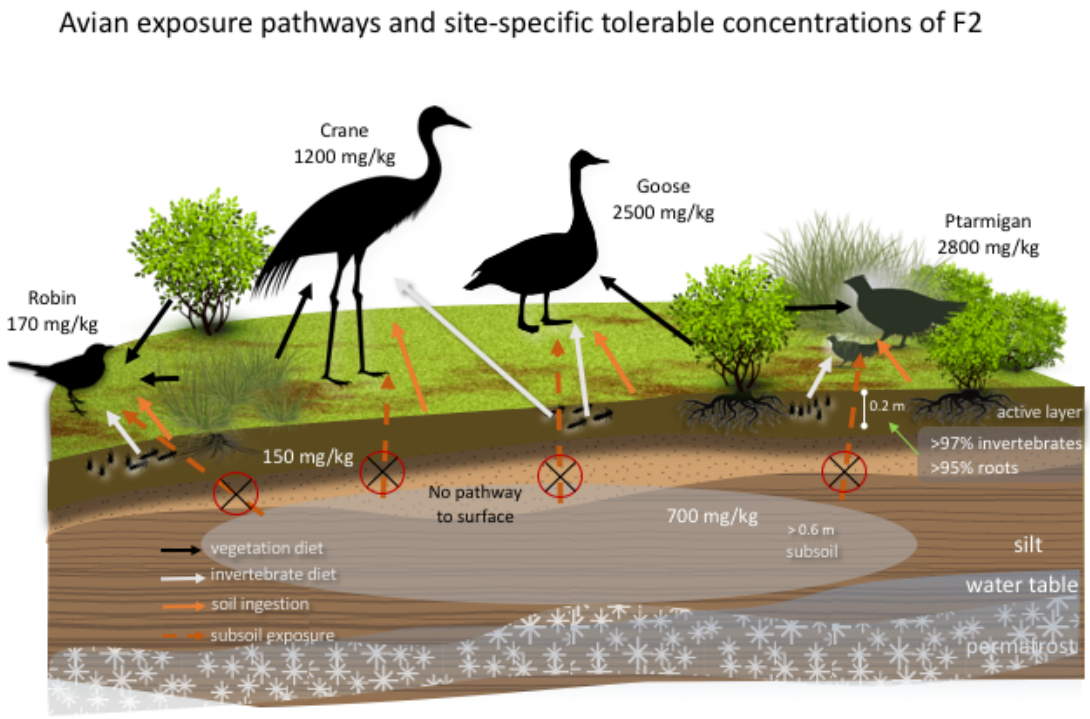

Figure 3. Conceptual model showing avian receptors and dietary exposure pathways. The risk-based tolerable concentration of F2 for each species is also shown in the model. For all but the robin, the tolerable F2 concentration is greater than the subsoil F2 concentrations found at Camp Farewell. Therefore, even if the birds were exposed to this subsoil in the future, increased risks of adverse effects are very unlikely.

- Mammals using the site are also at very low or no risk of adverse effects, even if they were to become chronically exposed to the site's subsoil, since all HQs are below 1.0. The single exception is the Masked Shrew, which for F2 and F3 has a calculated HQ of 4 and 3, respectively. In spite of these HQs which are greater than 1.0, shrews are unlikely to be affected on a population level due to safety factors built into the risk estimates of the SSRA and the unlikelihood of chronic exposure to subsoil. Figure 4 shows the operable pathways of exposure for the representative mammalian species most likely to experience potential effects from PHC contaminants at the site. The calculated protective F2 concentrations for hare, fox, and shrew indicate the difference between species' acceptable values and the concentrations in the subsoil or the surface soil.

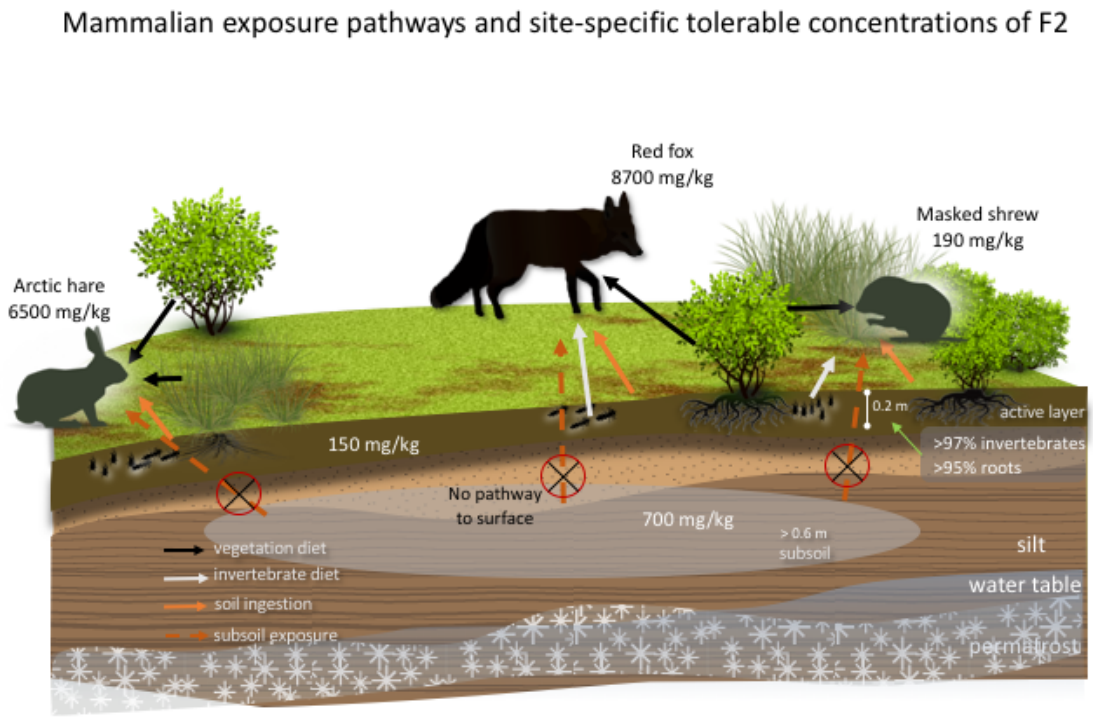

Figure 4. Conceptual model showing mammalian receptors and dietary exposure pathways. The risk-based tolerable concentration of F2 for each species is also shown in the model. For all but the Masked Shrew, the tolerable F2 concentration is greater than the subsoil F2 concentrations found at Camp Farewell. Therefore, even if the animals were exposed to this subsoil in the future, increased risks of adverse effects are very unlikely.

RECOMMENDATIONS

Based on the observations and results of the chemical and pathway screening and the quantitative SSRA, the following recommendations are proposed:

- Excavation below 0.6 m is not required to achieve risk-based protection of human or wildlife receptors.
- Hot-spot excavation to reduce localized concentrations below 5000 mg/kg F1-F3 total is expected to address risks associated with condensation of hydrocarbons to form free liquid phase. BH15-086, -089, and GS16-126 are specific locations with maximum F2 concentrations that would benefit from local excavation down to 1.5 m.
- Toluene or F3 guideline exceedances, in the absence of high F2 or other BTEX concentrations, are very likely due to biogenic sources, not fuel-related contamination. Excavation and remediation of these areas on the site and airstrip are likely not necessary; submitting samples to AGAT Laboratories in Calgary this year for specific confirmation of biogenic origin should confirm this approach.

LIMITATIONS AND QUALIFICATIONS

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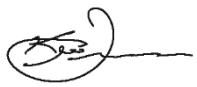
In conducting the risk assessment, GatePost Risk Analysis has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this report. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by GatePost Risk Analysis to be correct. GatePost Risk Analysis assumes no responsibility for any deficiency or inaccuracy in information received from others. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report.

Conclusions made within this report are a professional opinion at the time of the writing of this report, not a certification of the property's environmental condition.

CLOSURE

We trust this information meets your present requirements. Should you have any questions, please contact Ken Froese at 403.969.9716 or klfroese@gmail.com.

Prepared by:



Ken Froese, PhD, PChem (AB & BC)
Principal and Senior Risk Analyst
GatePost Risk Analysis
P.O. Box 2214
Yellowknife, NT X1A 2P6

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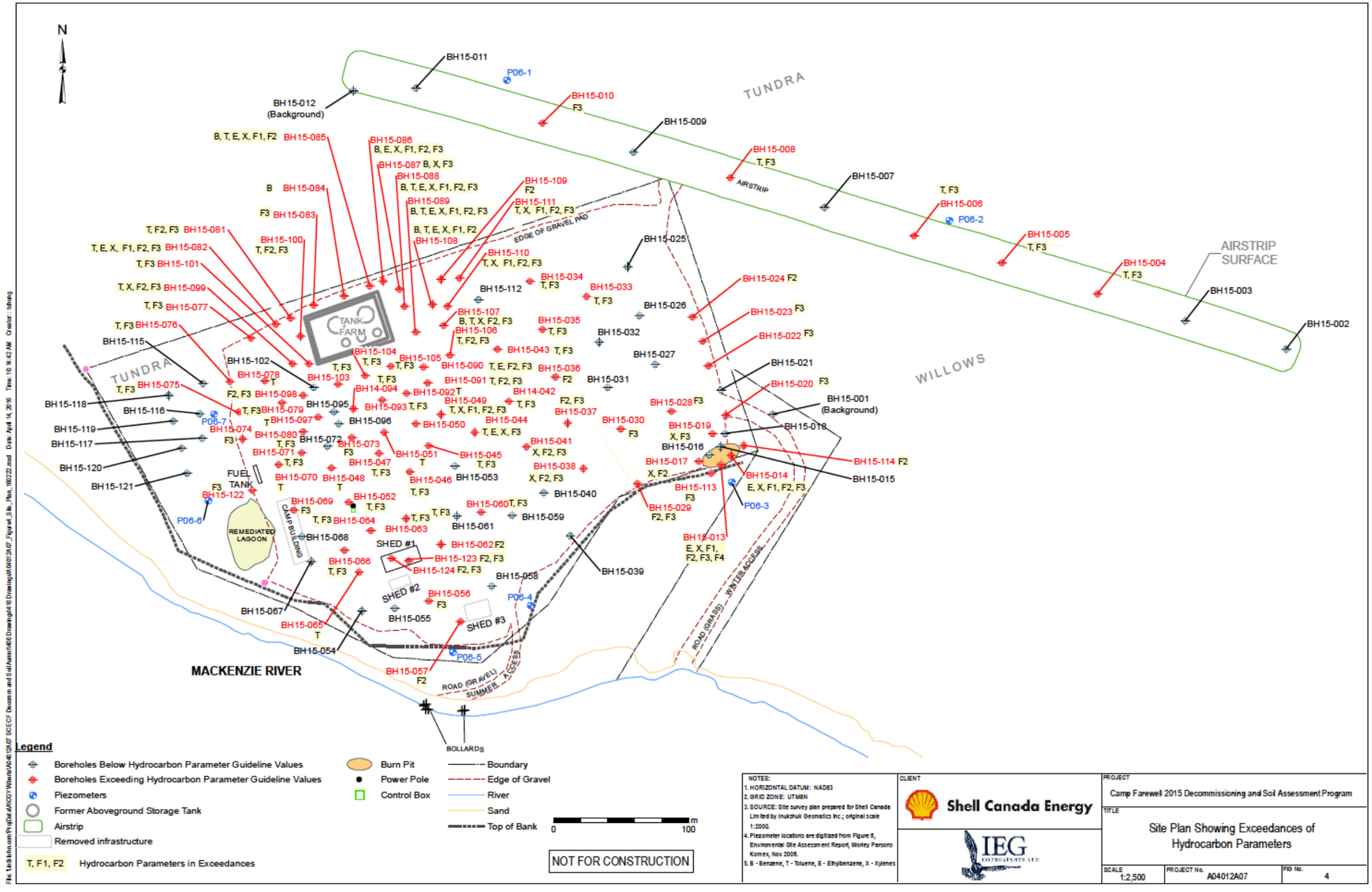
APPENDIX: DETAILED RISK RESULTS AND SITE SAMPLE LOCATIONS

Table A. Estimated daily dose and resulting hazard quotients for toddler and adult human receptor incidental soil ingestion and dermal transfer through contact with soil

COPC	Human Receptor - Incidental Soil Ingestion					
	Dose (mg/kg/day) = C_S x IR_S x RAF_{Oral} x D_2 x D_3 x D_4 / BW x LE [ab]					
	Dose (mg/kg/day)	TDI (mg/kg/day)	Hazard Quotient (unitless)	Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	ILCR (unitless)
TODDLER						
Benzene	5.3E-07	6.0E-03	8.9E-05			
Toluene	1.3E-05	2.2E-01	5.7E-05			
Ethylbenzene	1.0E-06	1.0E-01	1.0E-05			
Xylenes	1.9E-05	1.5E+00	1.3E-05			
F1		fraction dependent	2.9E-04			
Aliphatics C_6-C_8	2.7E-05	5.0E+00	5.3E-06			
Aliphatics $C_{>8}$-C_{10}	1.7E-05	1.0E-01	1.7E-04			
Aromatics $C_{>8}$-C_{10}	4.4E-06	4.0E-02	1.1E-04			
F2		fraction dependent	4.4E-02			
Aliphatics $C_{>10}$-C_{12}	1.2E-03	1.0E-01	1.2E-02			
Aliphatics $C_{>12}$-C_{16}	1.5E-03	1.0E-01	1.5E-02			
Aromatics $C_{>10}$-C_{12}	3.1E-04	4.0E-02	7.6E-03			
Aromatics $C_{>12}$-C_{16}	3.7E-04	4.0E-02	9.3E-03			
F3		fraction dependent	3.8E-02			
Aliphatics $C_{>16}$-C_{21}	3.0E-03	2.0E+00	1.5E-03			
Aliphatics $C_{>21}$-C_{34}	1.3E-03	2.0E+00	6.4E-04			
Aromatics $C_{>16}$-C_{21}	7.5E-04	3.0E-02	2.5E-02			
Aromatics $C_{>21}$-C_{34}	3.2E-04	3.0E-02	1.1E-02			
ADULT						
Benzene	3.1E-08	6.0E-03	5.2E-06	3.1E-08	0.08	2.5E-09
Toluene	7.4E-07	2.2E-01	3.3E-06			
Ethylbenzene	5.9E-08	1.0E-01	5.9E-07			
Xylenes	1.1E-06	1.5E+00	7.5E-07			
F1		fraction dependent	1.7E-05			
Aliphatics C_6-C_8	1.6E-06	5.0E+00	3.1E-07			
Aliphatics $C_{>8}$-C_{10}	1.0E-06	1.0E-01	1.0E-05			
Aromatics $C_{>8}$-C_{10}	2.5E-07	4.0E-02	6.4E-06			
F2		fraction dependent	2.6E-03			
Aliphatics $C_{>10}$-C_{12}	7.1E-05	1.0E-01	7.1E-04			
Aliphatics $C_{>12}$-C_{16}	8.7E-05	1.0E-01	8.7E-04			
Aromatics $C_{>10}$-C_{12}	1.8E-05	4.0E-02	4.5E-04			
Aromatics $C_{>12}$-C_{16}	2.2E-05	4.0E-02	5.4E-04			
F3		fraction dependent	2.2E-03			
Aliphatics $C_{>16}$-C_{21}	1.7E-04	2.0E+00	8.7E-05			
Aliphatics $C_{>21}$-C_{34}	7.5E-05	2.0E+00	3.7E-05			
Aromatics $C_{>16}$-C_{21}	4.4E-05	3.0E-02	1.5E-03			
Aromatics $C_{>21}$-C_{34}	1.9E-05	3.0E-02	6.2E-04			

COPC	Human Receptor - Dermal Contact with Soil					
	Dose (mg/kg/day) = $[(C_S \times SA_H \times SL_H) + (C_S \times SA_O \times SL_O)] \times RAF_{Derm} \times D_2 \times D_3 \times D_4$ / BW x LE [ab]					
	Dose (mg/kg/day)	TDI (mg/kg/day)	Hazard Quotient (unitless)	Dose (mg/kg/day)	Slope Factor $(mg/kg/day)^{-1}$	ILCR (unitless)
TODDLER						
Benzene	1.4E-08	6.0E-03	2.3E-06			
Toluene	3.3E-07	2.2E-01	1.5E-06			
Ethylbenzene	2.6E-08	1.0E-01	2.6E-07			
Xylenes	5.0E-07	1.5E+00	3.3E-07			
F1		fraction dependent	5.0E-05			
Aliphatics C_6-C_8	4.6E-06	5.0E+00	9.2E-07			
Aliphatics $C_{>8}$-C_{10}	3.0E-06	1.0E-01	3.0E-05			
Aromatics $C_{>8}$-C_{10}	7.5E-07	4.0E-02	1.9E-05			
F2		fraction dependent	7.6E-03			
Aliphatics $C_{>10}$-C_{12}	2.1E-04	1.0E-01	2.1E-03			
Aliphatics $C_{>12}$-C_{16}	2.6E-04	1.0E-01	2.6E-03			
Aromatics $C_{>10}$-C_{12}	5.3E-05	4.0E-02	1.3E-03			
Aromatics $C_{>12}$-C_{16}	6.4E-05	4.0E-02	1.6E-03			
F3		fraction dependent	6.5E-03			
Aliphatics $C_{>16}$-C_{21}	5.1E-04	2.0E+00	2.6E-04			
Aliphatics $C_{>21}$-C_{34}	2.2E-04	2.0E+00	1.1E-04			
Aromatics $C_{>16}$-C_{21}	1.3E-04	3.0E-02	4.3E-03			
Aromatics $C_{>21}$-C_{34}	5.5E-05	3.0E-02	1.8E-03			
ADULT						
Benzene	8.0E-09	6.0E-03	1.3E-06	8.0E-09	0.08	6.4E-10
Toluene	1.9E-07	2.2E-01	8.6E-07			
Ethylbenzene	1.5E-08	1.0E-01	1.5E-07			
Xylenes	2.9E-07	1.5E+00	1.9E-07			
F1		fraction dependent	2.9E-05			
Aliphatics C_6-C_8	2.7E-06	5.0E+00	5.3E-07			
Aliphatics $C_{>8}$-C_{10}	1.7E-06	1.0E-01	1.7E-05			
Aromatics $C_{>8}$-C_{10}	4.4E-07	4.0E-02	1.1E-05			
F2		fraction dependent	4.4E-03			
Aliphatics $C_{>10}$-C_{12}	1.2E-04	1.0E-01	1.2E-03			
Aliphatics $C_{>12}$-C_{16}	1.5E-04	1.0E-01	1.5E-03			
Aromatics $C_{>10}$-C_{12}	3.1E-05	4.0E-02	7.6E-04			
Aromatics $C_{>12}$-C_{16}	3.7E-05	4.0E-02	9.3E-04			
F3		fraction dependent	3.8E-03			
Aliphatics $C_{>16}$-C_{21}	3.0E-04	2.0E+00	1.5E-04			
Aliphatics $C_{>21}$-C_{34}	1.3E-04	2.0E+00	6.4E-05			
Aromatics $C_{>16}$-C_{21}	7.5E-05	3.0E-02	2.5E-03			
Aromatics $C_{>21}$-C_{34}	3.2E-05	3.0E-02	1.1E-03			



Legend

- Boreholes Below Hydrocarbon Parameter Guideline Values
- Boreholes Exceeding Hydrocarbon Parameter Guideline Values
- Piezometers
- Former Aboveground Storage Tank
- Airstrip
- Removed infrastructure
- T, F1, F2 Hydrocarbon Parameters in Exceedances
- Burn Pit
- Power Pole
- Control Box
- Boundary
- Edge of Gravel
- River
- Sand
- Top of Bank

0 100 m

NOT FOR CONSTRUCTION

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM8N
3. SOURCE: Site survey plan prepared for Shell Canada Limited by Inukshuk Geomatics Inc.; original scale 1:2000.
4. Piezometer locations are digitized from Figure 5, Environmental Site Assessment Report, Worley Parsons Komex, Nov 2006.
5. B - Benzene, T - Toluene, E - Ethylbenzene, X - Xylenes

CLIENT: Shell Canada Energy

IEG CONSULTANTS LTD.

PROJECT: Camp Farewell 2015 Decommissioning and Soil Assessment Program

TITLE: Site Plan Showing Exceedances of Hydrocarbon Parameters

SCALE	PROJECT No.	FIG No.
1:2,500	A04012A07	4

Figure A. Site plan of Camp Farewell showing locations of soil samples and exceedances of GNWT surface soil hydrocarbon guidelines. Figure excerpted from IEG 2016.

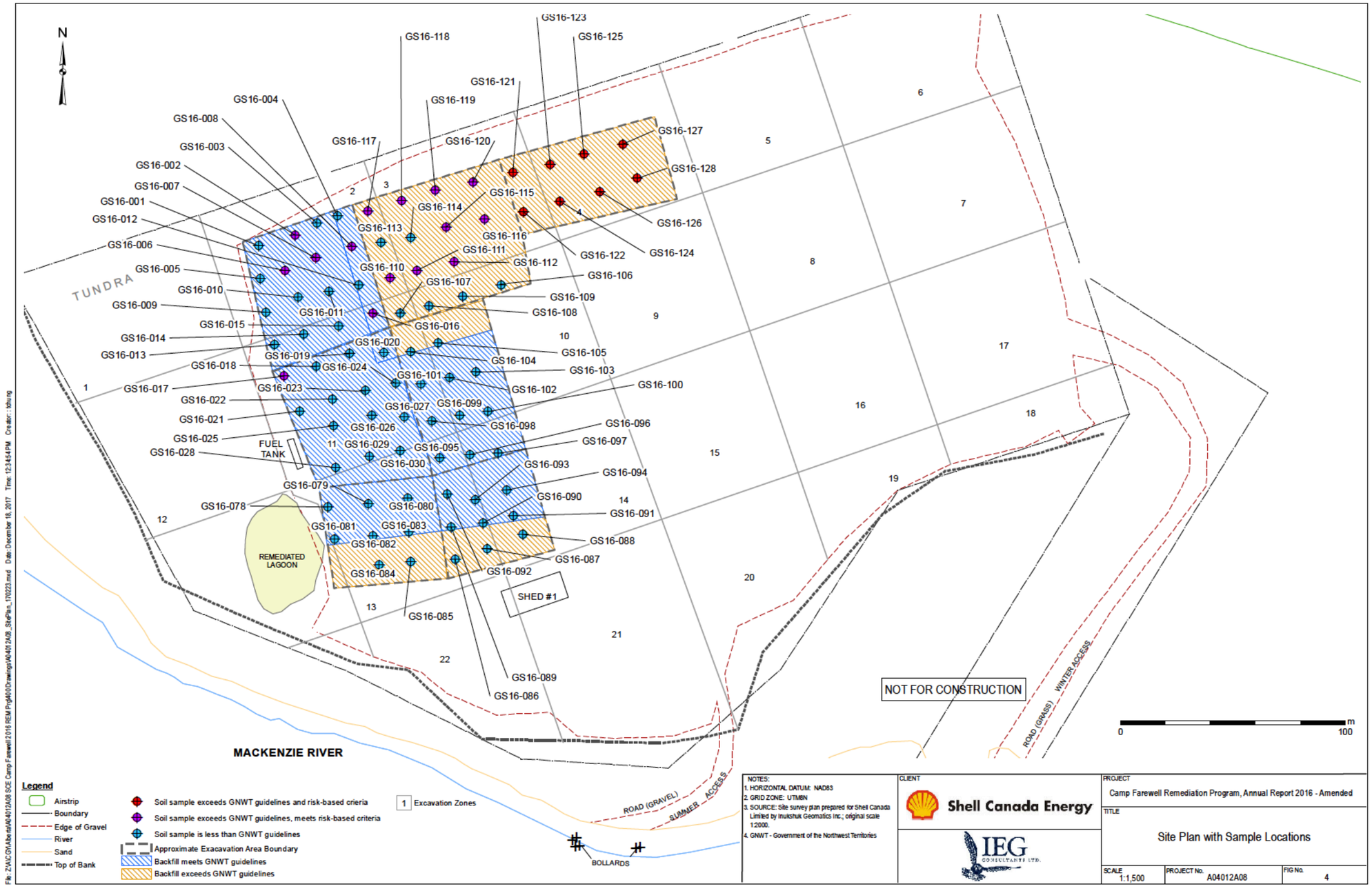


Figure B. Site plan of Camp Farewell showing locations of confirmation soil samples following 2016 excavation activities. Figure excerpted from IEG 2017.

APPENDIX X

Laboratory Analytical Reports

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: **IEG CONSULTANTS LTD**
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: **Nicole Wills**

PROJECT: **A04012A10**

AGAT WORK ORDER: **18E368251**

TRACE ORGANICS REVIEWED BY: **Violet Yu, Lab Coordinator**

DATE REPORTED: **Aug 03, 2018**

PAGES (INCLUDING COVER): **15**

VERSION*: **1**

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		EX18-001	EX18-003	EX18-004	EX18-005	EX18-006	EX18-007	EX18-008	EX18-009
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436324**	**9436328**	**9436329**	**9436330**	**9436331**	**9436332**	**9436333**	**9436334**
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	0.14	0.11	0.05	<0.05	0.06	0.10
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	0.17	<0.05	<0.05	0.05	0.09
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	170	60	720	640	560	500	1410	1080
C16 - C34 (F3)	mg/kg		10	280	200	680	960	960	690	1530	1220
C34 - C50 (F4)	mg/kg		10	60	60	30	190	220	120	270	200
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	11	17	13	23	25	25	25	23
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8 (BTEX)	%	50-150		97	98	98	98	95	97	97	97
Ethylbenzene-d10 (BTEX)	%	50-150		83	93	84	96	113	99	97	97
o-Terphenyl (F2-F4)	%	50-150		94	91	92	95	94	93	96	89

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TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		EX18-010	EX18-011	EX18-012	EX18-013	EX18-014	EX18-015	EX18-016	EX18-017
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436335**	**9436336**	**9436337**	**9436338**	**9436339**	**9436340**	**9436341**	**9436342**
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.07	<0.05	0.11	0.08	0.08	0.06	0.06
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	0.02	0.01	0.01	0.03	0.04
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	0.08	0.05	0.10	0.25	0.31
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	10	30	19
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	10	30	20
C10 - C16 (F2)	mg/kg		10	490	630	80	490	430	860	890	1210
C16 - C34 (F3)	mg/kg		10	660	700	200	550	690	1000	790	880
C34 - C50 (F4)	mg/kg		10	130	110	50	30	110	210	130	110
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	23	25	18	12	25	24	20	23
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8 (BTEX)	%	50-150		95	97	98	97	97	97	101	100
Ethylbenzene-d10 (BTEX)	%	50-150		93	102	93	90	110	108	96	96
o-Terphenyl (F2-F4)	%	50-150		90	88	91	95	82	88	77	93

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		EX18-018	EX18-019	EX18-020	EX18-021	EX18-022	EX18-023	EX18-024
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436343**	**9436344**	**9436345**	**9436346**	**9436347**	**9436348**	**9436349**
Benzene	mg/kg		0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	0.48	<0.05	0.08	0.10	0.11	0.09	0.06
Ethylbenzene	mg/kg		0.01	0.21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2.28	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	115	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	110	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	1890	390	980	240	40	160	30
C16 - C34 (F3)	mg/kg		10	1730	560	820	420	140	220	100
C34 - C50 (F4)	mg/kg		10	230	110	50	<10	30	30	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	31	17	11	5	23	20	21
Surrogate	**Unit**	**Acceptable Limits**								
Toluene-d8 (BTEX)	%	50-150		106	93	96	101	102	101	101
Ethylbenzene-d10 (BTEX)	%	50-150		121	93	85	79	94	82	80
o-Terphenyl (F2-F4)	%	50-150		97	93	90	91	89	85	85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9436324-9436349 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		EX18-002	WR1-001	WR1-002	WR1-003	WR1-004	WR1-005	WR2-001	WR2-R001
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436327**	**9436350**	**9436352**	**9436353**	**9436354**	**9436355**	**9436356**	**9436357**
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	770	670	510	360	410	110	300	290
C16 - C34 (F3)	mg/kg		10	630	540	460	340	380	210	450	400
C34 - C50 (F4)	mg/kg		10	70	60	50	40	40	40	40	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	17	18	18	17	12	12	12	14
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8 (BTEX)	%	50-150		97	107	106	107	108	108	108	107
Ethylbenzene-d10 (BTEX)	%	50-150		95	106	112	115	112	110	110	110
o-Terphenyl (F2-F4)	%	50-150		90	87	87	89	91	88	95	93

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		WR2-003	WR4-001	WR4-002	WR4-003	WR4-004	WR4-005	WR3-001	WR3-002
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436358**	**9436359**	**9436360**	**9436361**	**9436362**	**9436363**	**9436364**	**9436365**
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	320	160	100	240	190	360	240	60
C16 - C34 (F3)	mg/kg		10	490	310	230	350	450	420	380	190
C34 - C50 (F4)	mg/kg		10	60	50	50	60	80	70	30	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	17	18	18	15	16	17	13	15
Surrogate	**Unit**	**Acceptable Limits**									
Toluene-d8 (BTEX)	%	50-150		108	108	108	108	109	109	109	108
Ethylbenzene-d10 (BTEX)	%	50-150		110	116	108	109	102	112	104	106
o-Terphenyl (F2-F4)	%	50-150		90	91	81	89	89	88	94	87

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-07-28

DATE REPORTED: 2018-08-03

		SAMPLE DESCRIPTION:		WR3-003	WR3-004	WR3-005	WR4-R005	WR5-001	WR5-002	WR2-002
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26	2018-07-26
Parameter	**Unit**	**G / S**	**RDL**	**9436366**	**9436367**	**9436368**	**9436369**	**9436370**	**9436371**	**9436372**
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	100	150	130	240	1170	1040	120
C16 - C34 (F3)	mg/kg		10	190	390	260	250	760	800	310
C34 - C50 (F4)	mg/kg		10	30	90	30	<10	10	40	60
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	17	15	13	18	17	15	15
Surrogate	**Unit**	**Acceptable Limits**								
Toluene-d8 (BTEX)	%	50-150		108	108	108	108	107	107	106
Ethylbenzene-d10 (BTEX)	%	50-150		113	111	104	117	105	106	102
o-Terphenyl (F2-F4)	%	50-150		88	100	107	103	103	103	108

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9436327-9436372 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Aug 03, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1628	9436324	<0.005	<0.005	NA	< 0.005	103%	80%	120%	86%	80%	120%	85%	60%	140%
Toluene	1628	9436324	<0.05	<0.05	NA	< 0.05	92%	80%	120%	82%	80%	120%	73%	60%	140%
Ethylbenzene	1628	9436324	<0.01	<0.01	NA	< 0.01	82%	80%	120%	84%	80%	120%	70%	60%	140%
Xylenes	1628	9436324	<0.05	<0.05	NA	< 0.05	88%	80%	120%	83%	80%	120%	69%	60%	140%
C6 - C10 (F1)	1628	9436324	<10	<10	NA	< 10	91%	80%	120%	89%	80%	120%	67%	60%	140%
C10 - C16 (F2)	1221	9436324	170	140	19.4%	< 10	115%	80%	120%	103%	80%	120%	92%	60%	140%
C16 - C34 (F3)	1221	9436324	280	250	11.3%	< 10	119%	80%	120%	99%	80%	120%	94%	60%	140%
C34 - C50 (F4)	1221	9436324	60	50	18.2%	< 10	116%	80%	120%	88%	80%	120%	86%	60%	140%
Moisture Content	1221	9436324	11	13	16.7%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1772	9436026	<0.005	<0.005	NA	< 0.005	109%	80%	120%	89%	80%	120%	106%	60%	140%
Toluene	1772	9436026	<0.05	<0.05	NA	< 0.05	93%	80%	120%	92%	80%	120%	90%	60%	140%
Ethylbenzene	1772	9436026	<0.01	<0.01	NA	< 0.01	91%	80%	120%	90%	80%	120%	99%	60%	140%
Xylenes	1772	9436026	<0.05	<0.05	NA	< 0.05	84%	80%	120%	81%	80%	120%	95%	60%	140%
C6 - C10 (F1)	1772	9436026	<10	<10	NA	< 10	103%	80%	120%	83%	80%	120%	70%	60%	140%
C10 - C16 (F2)	1222	9436350	670	720	7.2%	< 10	92%	80%	120%	97%	80%	120%	107%	60%	140%
C16 - C34 (F3)	1222	9436350	540	550	1.8%	< 10	98%	80%	120%	94%	80%	120%	102%	60%	140%
C34 - C50 (F4)	1222	9436350	60	50	18.2%	< 10	99%	80%	120%	84%	80%	120%	89%	60%	140%
Moisture Content	1222	9436350	18	18	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1629	6350	< 0.005	< 0.005	NA	< 0.005	93%	80%	120%	91%	80%	120%	82%	60%	140%
Toluene	1629	6350	< 0.05	< 0.05	NA	< 0.05	92%	80%	120%	95%	80%	120%	84%	60%	140%
Ethylbenzene	1629	6350	< 0.01	< 0.01	NA	< 0.01	94%	80%	120%	102%	80%	120%	98%	60%	140%
Xylenes	1629	6350	< 0.05	< 0.05	NA	< 0.05	91%	80%	120%	97%	80%	120%	83%	60%	140%
C6 - C10 (F1)	1629	6350	< 10	< 10	NA	< 10	98%	80%	120%	111%	80%	120%	77%	60%	140%
C10 - C16 (F2)	1222	9436350	670	720	7.2%	< 10	92%	80%	120%	97%	80%	120%	107%	60%	140%
C16 - C34 (F3)	1222	9436350	540	550	1.8%	< 10	98%	80%	120%	94%	80%	120%	102%	60%	140%
C34 - C50 (F4)	1222	9436350	60	50	18.2%	< 10	99%	80%	120%	84%	80%	120%	89%	60%	140%
Moisture Content	1222	9436350	18	18	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
C10 - C16 (F2)	1142	9436712	< 10	< 10	NA	< 10	106%	80%	120%	105%	80%	120%	102%	60%	140%
C16 - C34 (F3)	1142	9436712	100	110	9.5%	< 10	107%	80%	120%	113%	80%	120%	110%	60%	140%
C34 - C50 (F4)	1142	9436712	< 10	<10	NA	< 10	108%	80%	120%	92%	80%	120%	90%	60%	140%
Moisture Content	1142	9436712	23	26	12.2%	< 1									

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Aug 03, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E368251

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature: 10.8 °C
AGAT Job Number: 18E368251
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: JEG Consultants
Contact: Nicole Wills
Address: 500-2618 Hopewell Place
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A040102-A10
Sampled By: Stephanie Hannem

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Kim MacKenzie
Email: kmackenzie@klohn.com
3. Name: Nicole Wills
Email: nwills@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☒ / No ☐
Company: Same as above
Contact:
Address:
Phone: Fax:
PO/AFE#: I02018-002
Standing Offer #:

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
☐ Single Sample Per Page
☒ Multiple Samples Per Page
☐ Export

18 JUL 28 11:37

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS/JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9436324	EX18-001	0.6	July 26/18	Soil	3				X									
2	327	EX18-002				3				X									
3	328	EX18-003				3				X									
4	329	EX18-004				3				X									
5	330	EX18-005				3				X									
6	331	EX18-006				3				X									
7	332	EX18-007				3				X									
8	333	EX18-008				3				X									
9	334	EX18-009				3				X									
10	335	EX18-010				3				X									

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	July 26/18 18:30	Jason Trasmonte	28 July 18 1137

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Page 1 of 3

N°: AB 090050

Document ID: DIV-50-1507.005.

Date Revised: May 10, 2018

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Chain of Custody Record

18E368251

Report to:

Company: IEG Consultants

Same as COC#: 090050

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9436336	EX18-011	Soil	July 26/18		3		X											
337	EX18-012				3		X											
338	EX18-013				3		X											
339	EX18-014				3		X											
340	EX18-015				3		X											
341	EX18-016				3		X											
342	EX18-017				3		X											
343	EX18-018				3		X											
344	EX18-019				3		X											
345	EX18-020				3		X											
346	EX18-021				3		X											
347	EX18-022				3		X											
348	EX18-023				3		X											
349	EX18-024				3		X											
	~~EX18-025~~																	
350	WR1-001				2		X											
352	WR1-002				2		X											
353	WR1-003				2		X											
354	WR1-004				2		X											
355	WR1-005				2		X											
356	WR2-001				2		X											
357	WR2-R001				2		X											
358	WR2-003				2		X											
359	WR4-001				2		X											
360	WR4-002				2		X											

18 JUL 28 1137

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	July 26/18 18:30	J. Trasmonte	28 July 18 1137
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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Nº: AB 039566 A

Document ID: DIV-50-1507.002

Date Revised: December 8th, 2013

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Calgary, Alberta
T2E 7P7
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P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

18E368251

Report to:

Company: IEG Consultants

Same as COC#: 090050

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^{6} ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐							HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9436361	WR4-003	Soil	July 26/18		2		X									'18 JUL 28 11:37							
362	WR4-004				2		X																
363	WR4-005				2		X																
364	WR3-001				2		X																
365	WR3-002				2		X																
366	WR3-003				2		X																
367	WR3-004				2		X																
368	WR3-005				2		X																
369	~~WR3-006~~ WR4-R005				2		X																
370	WR5-001				2		X																
371	WR5-002				2		X																
372	WR2-002				2		X																

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	July 26/18 18:30	J. Trasmonte	28 July 18 1137H
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

Page 3 of 3

Nº: AB 039567 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

10.8°C

RECEIVING BASICS - Shipping

Company/Consultant: IEG Consultants

Courier: Canadian North (Prepaid) Collect

Waybill# 518-YEV-32306643

Branch (EDM) GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: X

Hydrocarbons: Earliest Expiry Terracore

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 10.4+9.8+12.1=10.8 °C	2 (Bottle/Jar) 10.3+9.9+11.0=10.7 °C
3 (Bottle/Jar)___+___+___=____ °C	4 (Bottle/Jar)___+___+___=____ °C
5 (Bottle/Jar)___+___+___=____ °C	6 (Bottle/Jar)___+___+___=____ °C
7 (Bottle/Jar)___+___+___=____ °C	8 (Bottle/Jar)___+___+___=____ °C
9 (Bottle/Jar)___+___+___=____ °C	10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E368251

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial____ See SIR for discrepancy details.

General Comments: A box of vials found upside down inside one of the cooler. Some vials don't have methanol inside and some are below the limit line.

smpls 350-372 - no MeOH vials provided.

smpls 327B/C - no soil present in vials.

smpls 345C, 346C - MeOH below 10mL line.

smpl 349C - MeOH right on 10mL line.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-32306643

Shipper's Name and Address
Nom et adresse de l'expediteur

Northwind Industries Ltd
146 Navy Rd
Inuvik
Northwest Territories, Canada
X0E 0T0 867-777-2426

Not negotiable / Non négociable
Air Waybill / Lettre de transport aérien
Issued by / Emise par

Canadian North: 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont originaux et ont la meme validité.

Consignee's Name and Address
Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ETRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables

NOR178CW

Northwind Industries Inc.
146 Navy Rd.
Inuvik
NT, Canada
X0E 0T0
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de comple

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé

Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	**CANADIAN NORTH**				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val		Other/Autres		Declared Value for Carriage Valeur declarée pour la transport	Declared value for Customs Valeur déclarée pour la douane
		PPD Payé	COLL Du	PPD Payé	COLL Du		
CDN	**PX**	**X**		**X**		**NDV**	**NCV**

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lássurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition

HFPU
Attn: Nicole Willis

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
2	43	K	43				GEN	Soil Samples 60cm x 33cm x 71cm
2	**43**		**43**					

Weight Charge **Prepaid / Porte payé**	Taxation au poids **Collect / Port dû**	Other Charges / Autres frais
Valuation Charge	Taxation à la valeur	
Tax	Taxe	
Total other Charges Due Agent	Total des autres frais dûs à l'agent	Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.
Total other Charges Due Carrier	Total des autres frais dûs au	
		Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent
Total Prepaid / Total port payé	Total collect / Total port dû	
		27 Jul 2018 YEV Executed on (Date) at (Place) / Fait le (Date) à (Lieu) Signature of issuing Carrier or its Agent / Signature du Transporteur émetteur ou de son Agent
For Carrier's User only at Destination / Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée	Total Collect Charges / Total Du

518-YEV-32306643

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E369461

TRACE ORGANICS REVIEWED BY: Violet Yu, Lab Coordinator

DATE REPORTED: Aug 08, 2018

PAGES (INCLUDING COVER): 26

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		EX18-025	EX18-026	EX18-027	EX18-028	EX18-029	EX18-R029	EX18-030	EX18-031
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30
Parameter	Unit	G / S	RDL	9442763	9442764	9442765	9442766	9442767	9442768	9442769	9442770
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005
Toluene	mg/kg		0.05	0.63	0.15	0.17	0.09	1.21	1.57	0.34	1.37
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.27	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	90	420	100	40	40	140	20
C16 - C34 (F3)	mg/kg		10	160	340	710	310	370	590	400	360
C34 - C50 (F4)	mg/kg		10	80	150	280	140	160	260	190	170
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	28	26	23	9	34	44	11	25
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		94	95	95	94	94	94	94	94
Ethylbenzene-d10 (BTEX)	%	50-150		90	93	103	78	98	110	86	90
o-Terphenyl (F2-F4)	%	50-150		97	98	89	100	97	100	94	94

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		EX18-032	EX18-033
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-07-30	2018-07-30
Parameter	Unit	G / S	RDL	9442771	9442772
Benzene	mg/kg		0.005	<0.005	<0.005
Toluene	mg/kg		0.05	0.68	0.92
Ethylbenzene	mg/kg		0.01	<0.01	0.02
Xylenes	mg/kg		0.05	<0.05	0.11
C6 - C10 (F1)	mg/kg		10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	20
C16 - C34 (F3)	mg/kg		10	150	50
C34 - C50 (F4)	mg/kg		10	70	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A
Moisture Content	%		1	14	38
Surrogate	Unit	Acceptable Limits			
Toluene-d8 (BTEX)	%	50-150		95	95
Ethylbenzene-d10 (BTEX)	%	50-150		83	88
o-Terphenyl (F2-F4)	%	50-150		97	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9442763-9442772 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories
6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		WR8-001	WR8-002	WR8-003	WR8-004	WR8-005	WR14-001	WR14-002	WR14-003
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30	2018-07-30
Parameter	Unit	G / S	RDL	9442789	9442790	9442791	9442792	9442793	9442794	9442795	9442796
Benzene	mg/kg		0.005	<0.005	<0.005	4.14	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	23.9	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	4.91	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	27.3	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	190	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	130	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	220	150	220	320	290	260	210	270
C16 - C34 (F3)	mg/kg		10	270	230	370	640	500	190	170	200
C34 - C50 (F4)	mg/kg		10	40	70	170	160	90	50	60	50
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	15	15	18	24	16	17	15	13
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		93	94	95	98	99	97	97	99
Ethylbenzene-d10 (BTEX)	%	50-150		82	82	82	64	66	64	65	60
o-Terphenyl (F2-F4)	%	50-150		82	88	103	96	89	88	87	88

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Certificate of Analysis

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		WR14-004	WR14-005
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-07-30	2018-07-30
Parameter	Unit	G / S	RDL	9442797	9442798
Benzene	mg/kg		0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.07
Ethylbenzene	mg/kg		0.01	<0.01	0.01
Xylenes	mg/kg		0.05	0.07	0.10
C6 - C10 (F1)	mg/kg		10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10
C10 - C16 (F2)	mg/kg		10	180	300
C16 - C34 (F3)	mg/kg		10	230	330
C34 - C50 (F4)	mg/kg		10	80	110
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A
Moisture Content	%		1	13	14
Surrogate	Unit	Acceptable Limits			
Toluene-d8 (BTEX)	%	50-150		98	97
Ethylbenzene-d10 (BTEX)	%	50-150		59	62
o-Terphenyl (F2-F4)	%	50-150		89	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9442789-9442798 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil + Chroms (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

				BH18-01 @	BH18-01 @ 0.	BH18-02 @	BH18-02 @ 0.	BH18-03 @	BH18-03 @ 0.	BH18-04 @ 0.	BH18-04 @ 0.
		SAMPLE DESCRIPTION:		0-0.3	6-0.9	0-0.3	3-0.6	0-0.3	6-0.9	3-0.6	6-0.9
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-07-29	2018-07-29	2018-07-29	2018-07-29	2018-07-29	2018-07-29	2018-07-29	2018-07-29
Parameter	Unit	G / S	RDL	9442739	9442753	9442754	9442755	9442756	9442757	9442758	9442759
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	30	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	<10	10	<10	<10	30	50	40	500
C34 - C50 (F4)	mg/kg		10	<10	20	<10	<10	20	40	30	330
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	5	11	5	6	6	8	8	54
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		96	95	96	95	95	94	93	94
Ethylbenzene-d10 (BTEX)	%	50-150		88	82	110	81	86	83	73	116
o-Terphenyl (F2-F4)	%	50-150		105	88	97	88	93	90	93	92

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AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil + Chroms (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

				BH18-04R @ 0.	BH18-05 @	BH18-05 @ 0.
		SAMPLE DESCRIPTION:		3-0.6	0-0.3	3-0.6
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-07-29	2018-07-29	2018-07-29
Parameter	Unit	G / S	RDL	9442760	9442761	9442762
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	30	20	20
C34 - C50 (F4)	mg/kg		10	20	20	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A
Moisture Content	%		1	6	7	10
Surrogate	Unit	Acceptable Limits				
Toluene-d8 (BTEX)	%	50-150		96	93	94
Ethylbenzene-d10 (BTEX)	%	50-150		81	89	87
o-Terphenyl (F2-F4)	%	50-150		94	97	90

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AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil + Chroms (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-01

DATE REPORTED: 2018-08-08

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9442739-9442762 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Aug 08, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil + Chroms (CWS) (Methanol Field Stabilized)															
Benzene	1894	9442765	< 0.005	< 0.005	NA	< 0.005	115%	80%	120%	94%	80%	120%	91%	60%	140%
Toluene	1894	9442765	0.17	0.17	NA	< 0.05	102%	80%	120%	88%	80%	120%	78%	60%	140%
Ethylbenzene	1894	9442765	<0.01	0.01	NA	< 0.01	93%	80%	120%	89%	80%	120%	77%	60%	140%
Xylenes	1894	9442765	< 0.05	< 0.05	NA	< 0.05	108%	80%	120%	84%	80%	120%	80%	60%	140%
C6 - C10 (F1)	1894	9442765	< 10	< 10	NA	< 10	96%	80%	120%	111%	80%	120%	77%	60%	140%
C10 - C16 (F2)	973	9442765	420	410	2.4%	< 10	105%	80%	120%	99%	80%	120%	87%	60%	140%
C16 - C34 (F3)	973	9442765	710	690	2.9%	< 10	106%	80%	120%	98%	80%	120%	87%	60%	140%
C34 - C50 (F4)	973	9442765	280	260	7.4%	< 10	102%	80%	120%	105%	80%	120%	92%	60%	140%
Moisture Content	973	9442765	22	23	4.4%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1894	9442772	<0.005	<0.005	NA	< 0.005	115%	80%	120%	101%	80%	120%	95%	60%	140%
Toluene	1894	9442772	0.92	0.87	5.6%	< 0.05	102%	80%	120%	93%	80%	120%	86%	60%	140%
Ethylbenzene	1894	9442772	0.02	0.01	NA	< 0.01	93%	80%	120%	89%	80%	120%	84%	60%	140%
Xylenes	1894	9442772	0.11	0.09	NA	< 0.05	108%	80%	120%	82%	80%	120%	70%	60%	140%
C6 - C10 (F1)	1894	9442772	<10	<10	NA	< 10	96%	80%	120%	98%	80%	120%	69%	60%	140%
C10 - C16 (F2)	1329	9442277	20	20	NA	< 10	91%	80%	120%	92%	80%	120%	117%	60%	140%
C16 - C34 (F3)	1329	9442772	50	50	0.0%	< 10	94%	80%	120%	102%	80%	120%	134%	60%	140%
C34 - C50 (F4)	1329	9442772	70	50	33.3%	< 10	94%	80%	120%	108%	80%	120%	136%	60%	140%
Moisture Content	1329	9442772	38	38	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1776	9442793	<0.005	<0.005	NA	< 0.005	97%	80%	120%	82%	80%	120%	109%	60%	140%
Toluene	1776	9442793	<0.05	<0.05	NA	< 0.05	95%	80%	120%	82%	80%	120%	104%	60%	140%
Ethylbenzene	1776	9442793	<0.01	<0.01	NA	< 0.01	98%	80%	120%	83%	80%	120%	110%	60%	140%
Xylenes	1776	9442793	<0.05	<0.05	NA	< 0.05	97%	80%	120%	80%	80%	120%	102%	60%	140%
C6 - C10 (F1)	1776	9442793	<10	<10	NA	< 10	92%	80%	120%	85%	80%	120%	121%	60%	140%
C10 - C16 (F2)	1224	9442793	290	310	6.7%	< 10	94%	80%	120%	107%	80%	120%	98%	60%	140%
C16 - C34 (F3)	1224	9442793	500	500	0.0%	< 10	100%	80%	120%	102%	80%	120%	94%	60%	140%
C34 - C50 (F4)	1224	9442793	90	80	11.8%	< 10	103%	80%	120%	95%	80%	120%	88%	60%	140%
Moisture Content	1224	9442793	16	16	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															

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6310 ROPER ROAD
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CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE001: 9442739, BH18-01 @ 0-0.3

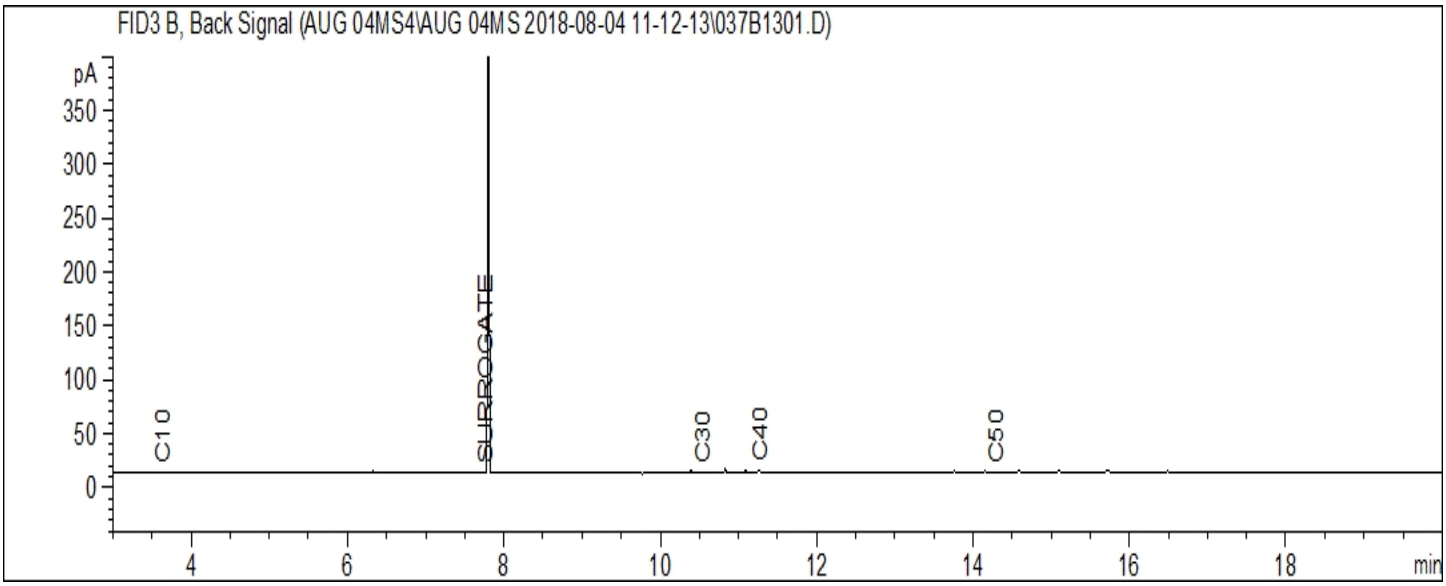
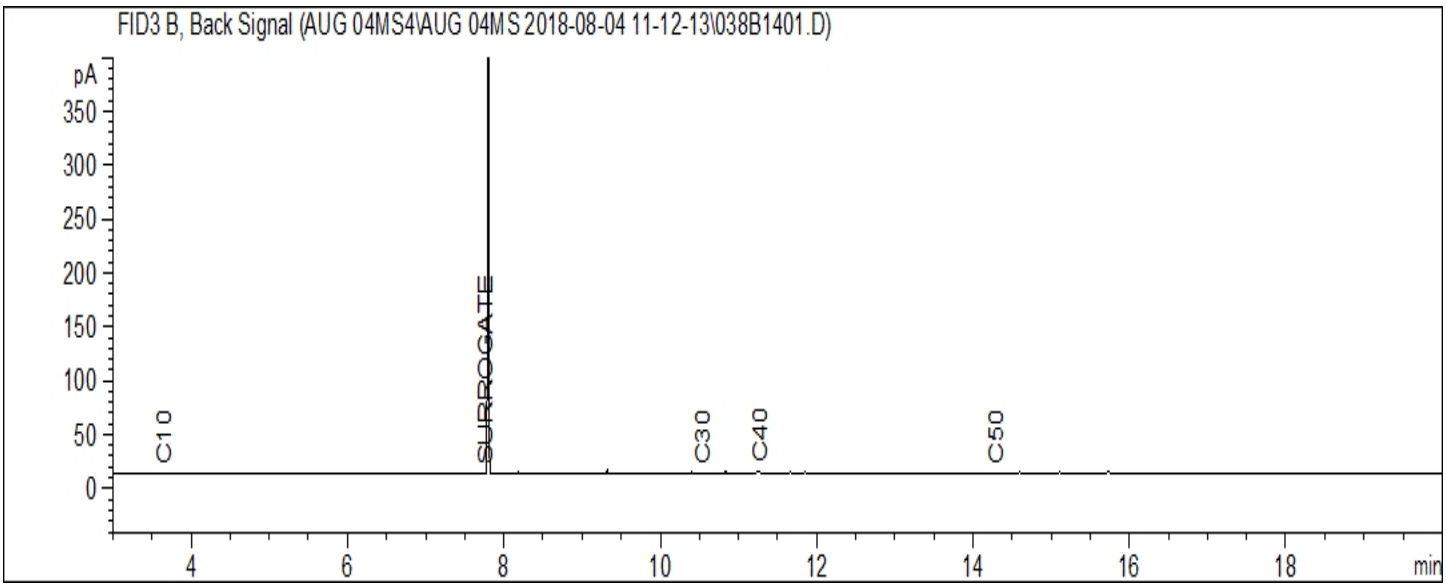


IMAGE002: 9442753, BH18-01 @ 0.6-0.9



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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

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IMAGE003: 9442754, BH18-02 @ 0-0.3

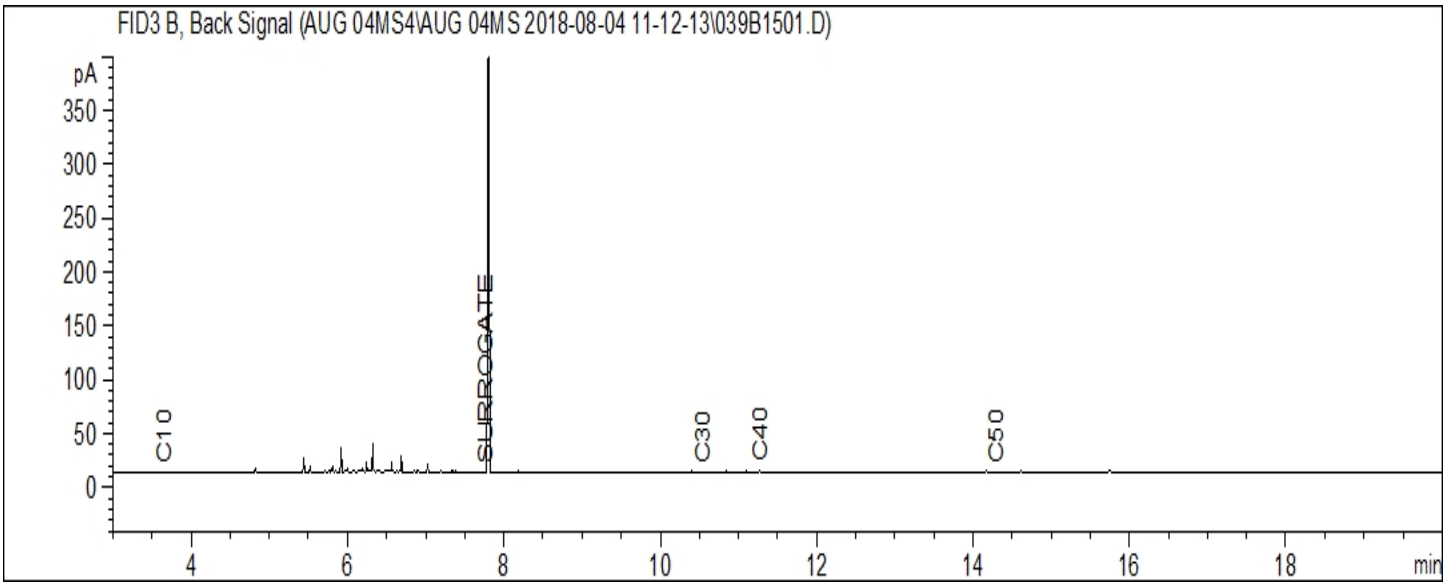
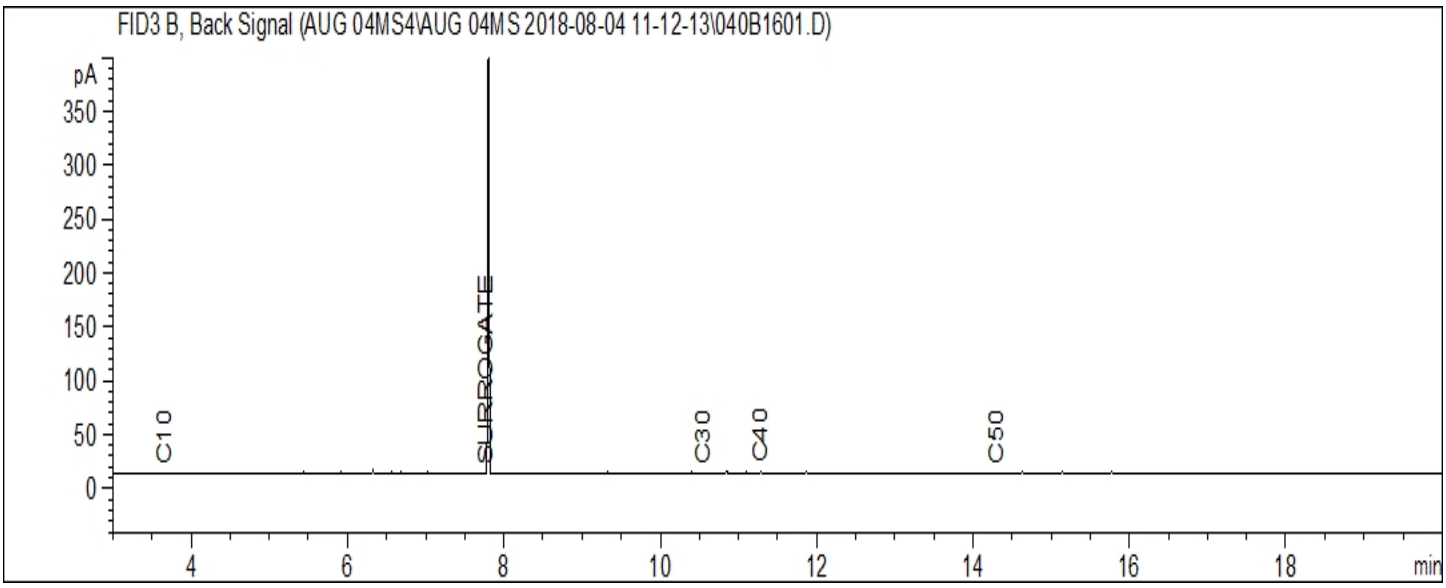


IMAGE004: 9442755, BH18-02 @ 0.3-0.6



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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE005: 9442756, BH18-03 @ 0-0.3

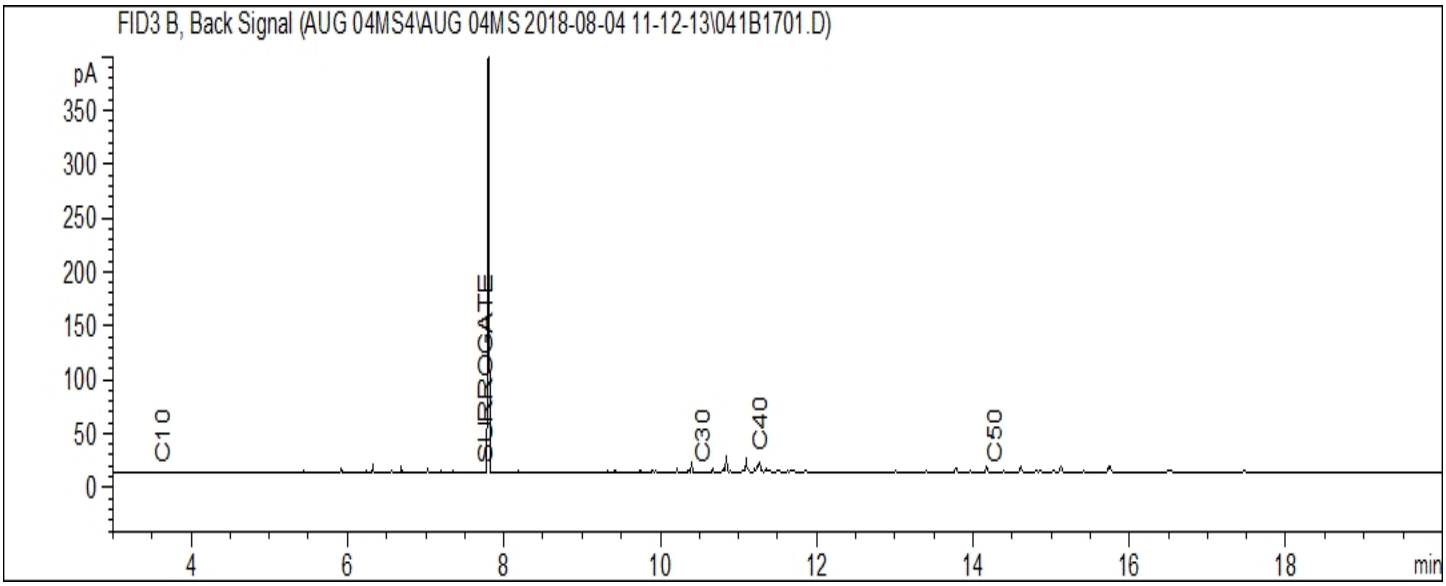
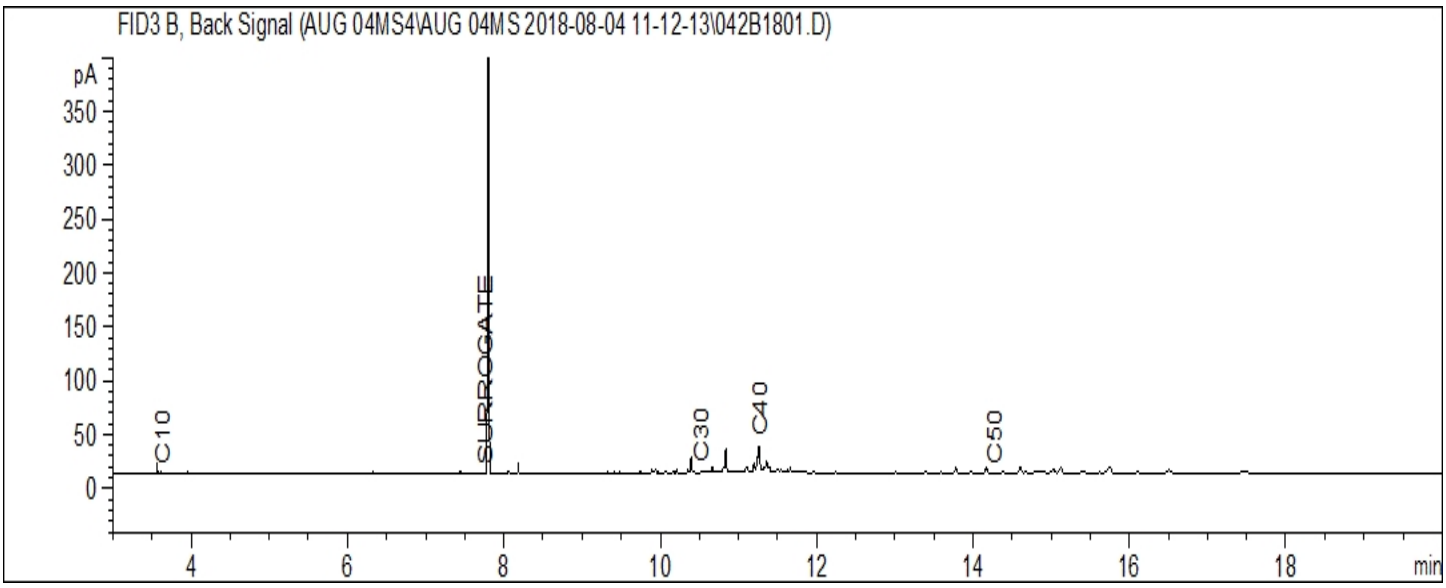


IMAGE006: 9442757, BH18-03 @ 0.6-0.9



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FAX (780)462-2490
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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE007: 9442758, BH18-04 @ 0.3-0.6

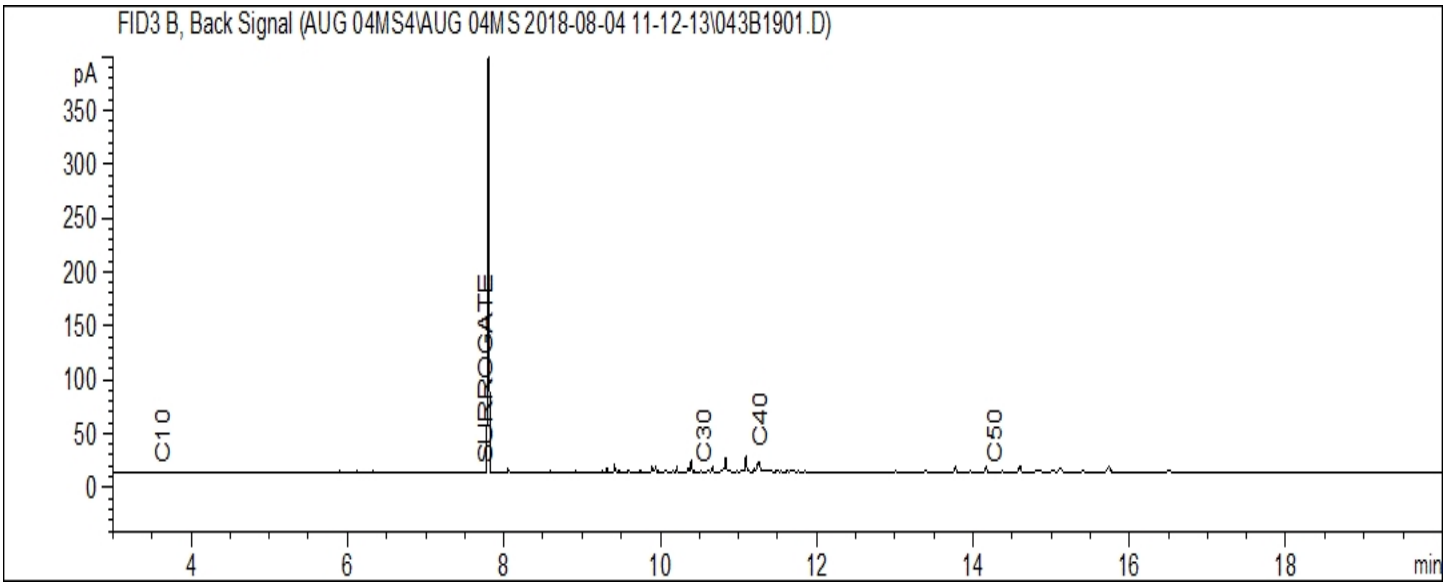
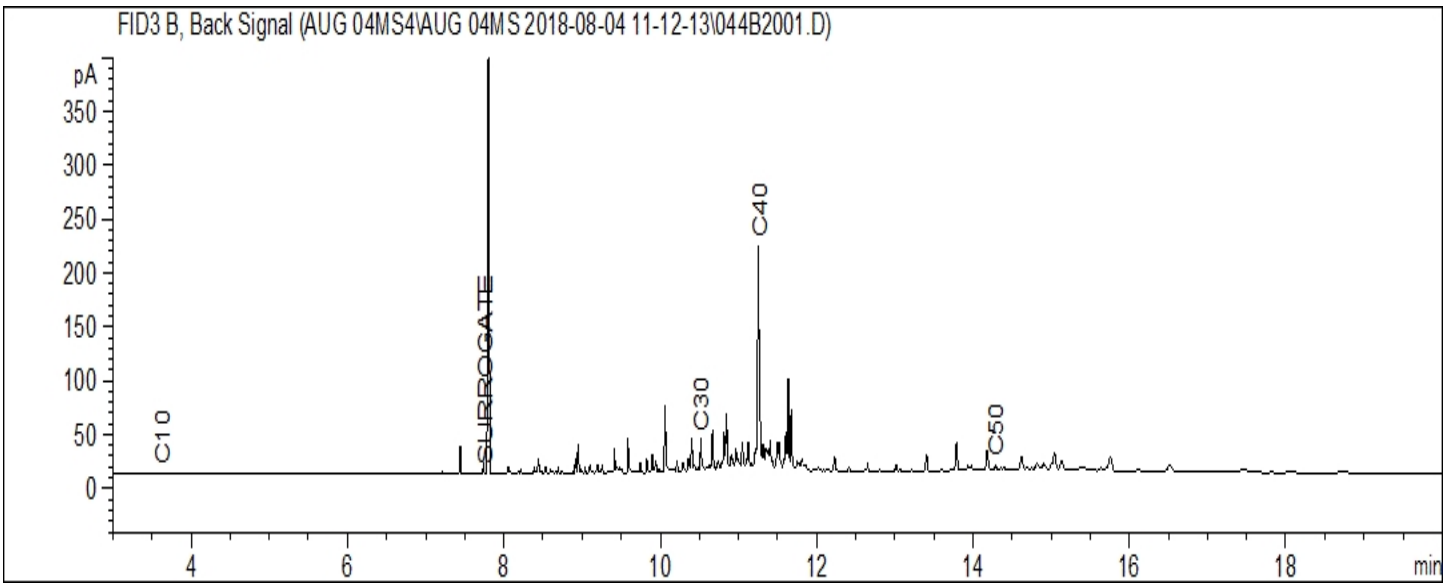


IMAGE008: 9442759, BH18-04 @ 0.6-0.9



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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE009: 9442760, BH18-04R @ 0.3-0.6

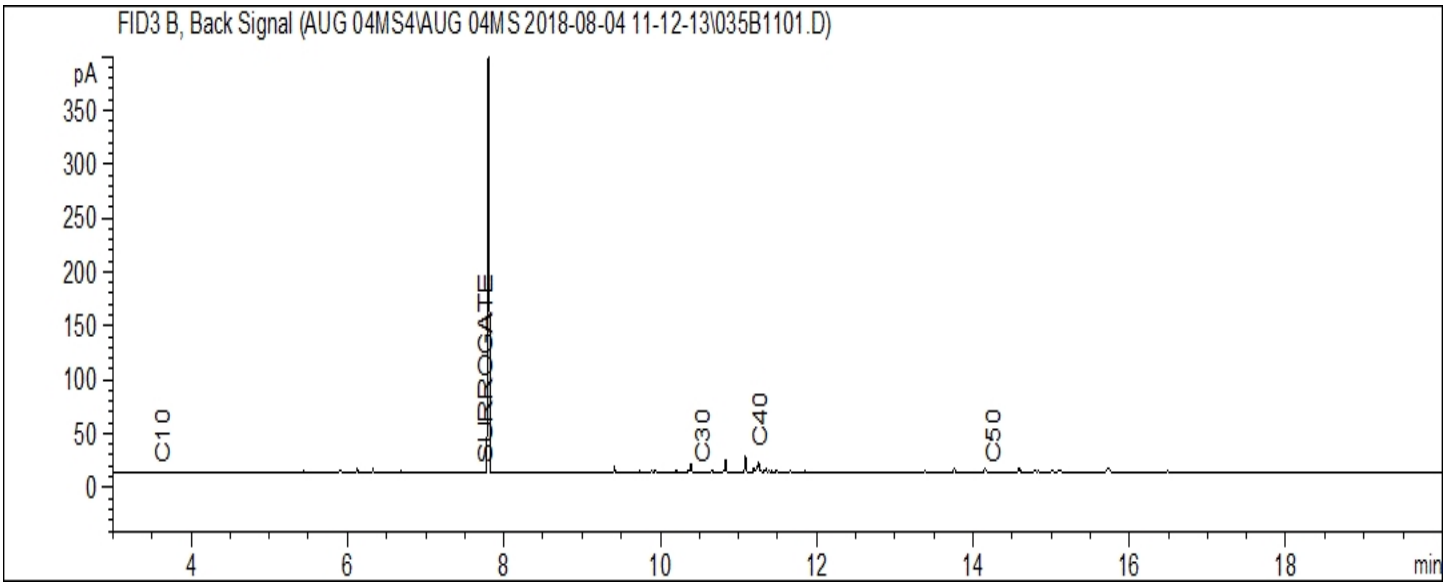
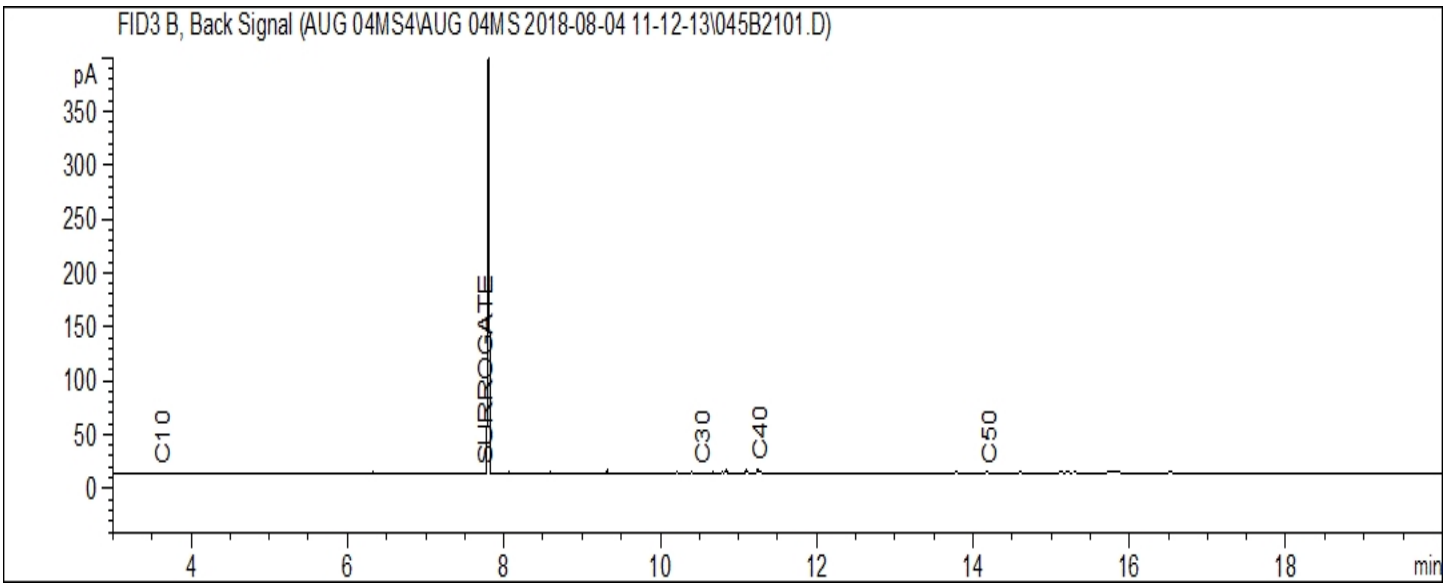


IMAGE010: 9442761, BH18-05 @ 0-0.3



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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE011: 9442762, BH18-05 @ 0.3-0.6

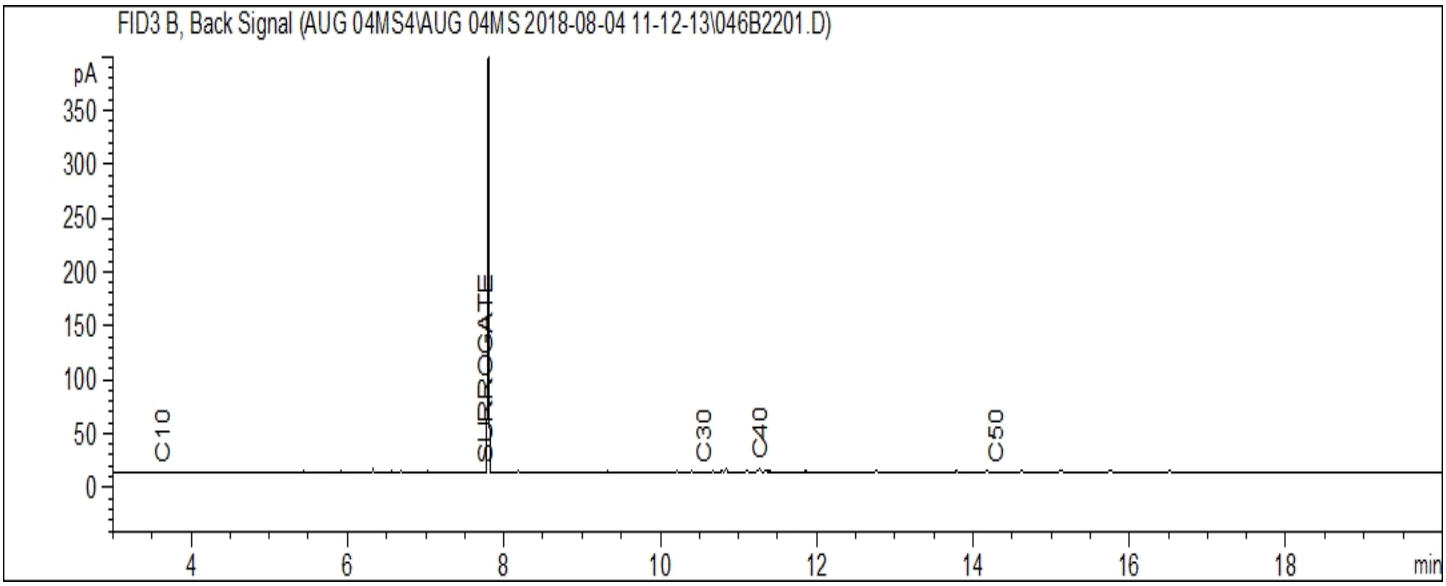
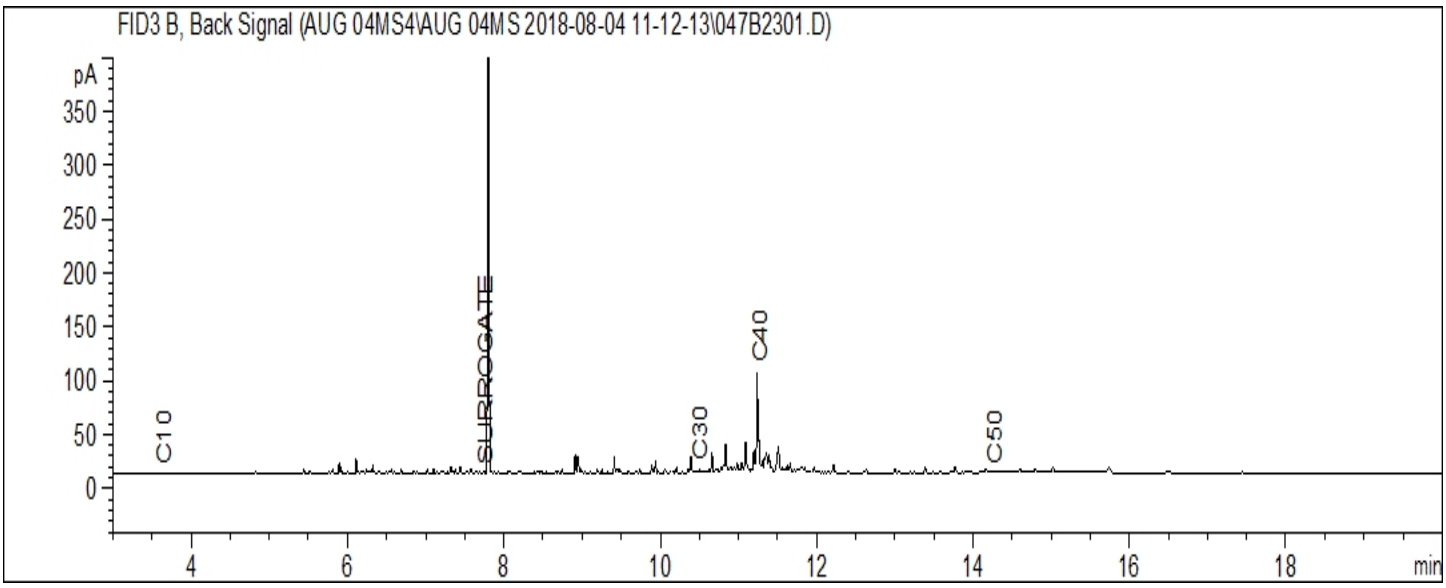


IMAGE012: 9442763, EX18-025



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CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE013: 9442764, EX18-026

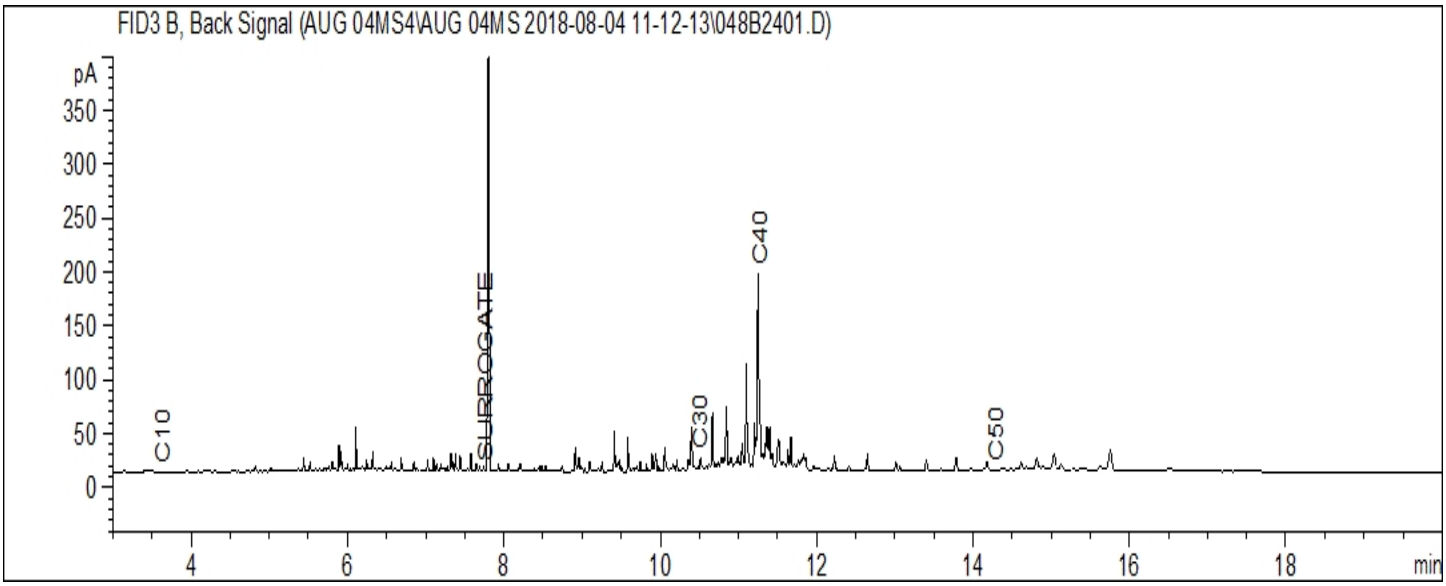
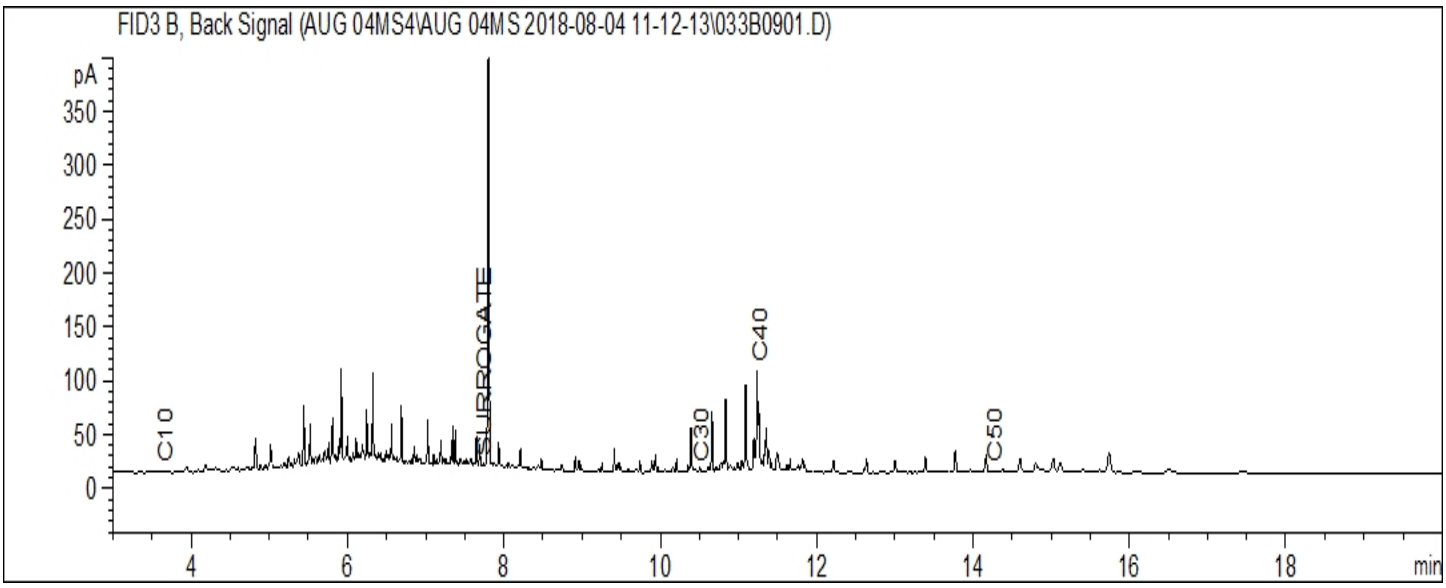


IMAGE014: 9442765, EX18-027



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CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE015: 9442765 - DUP, EX18-027

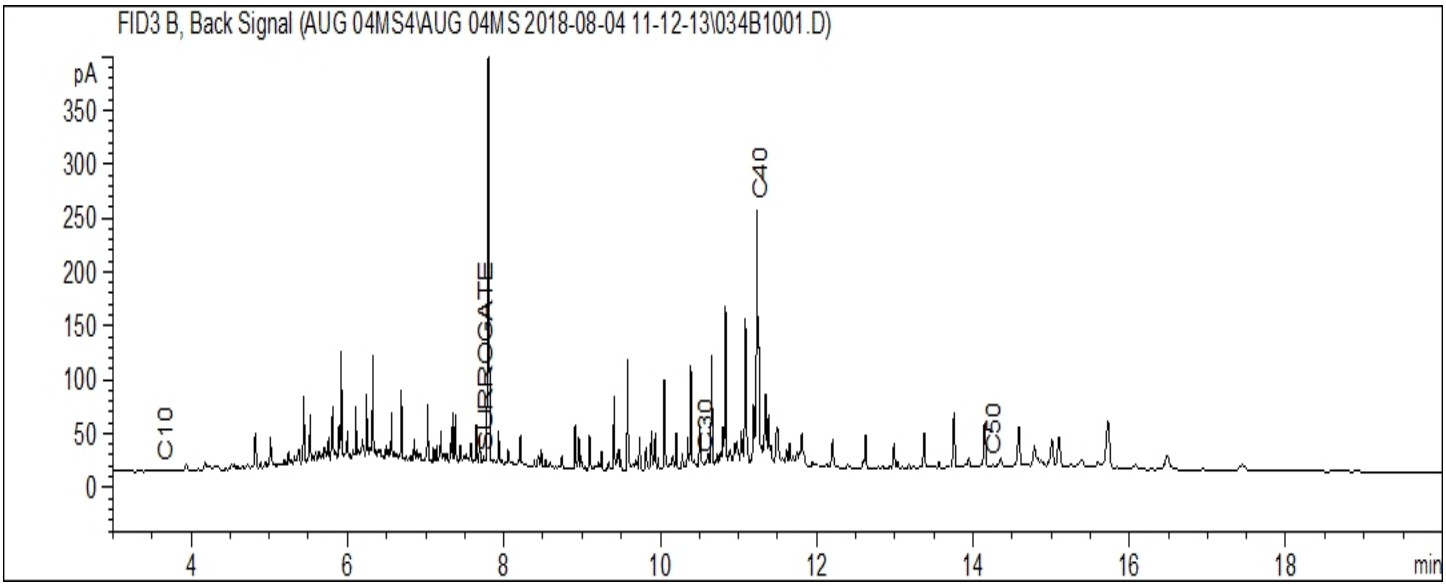
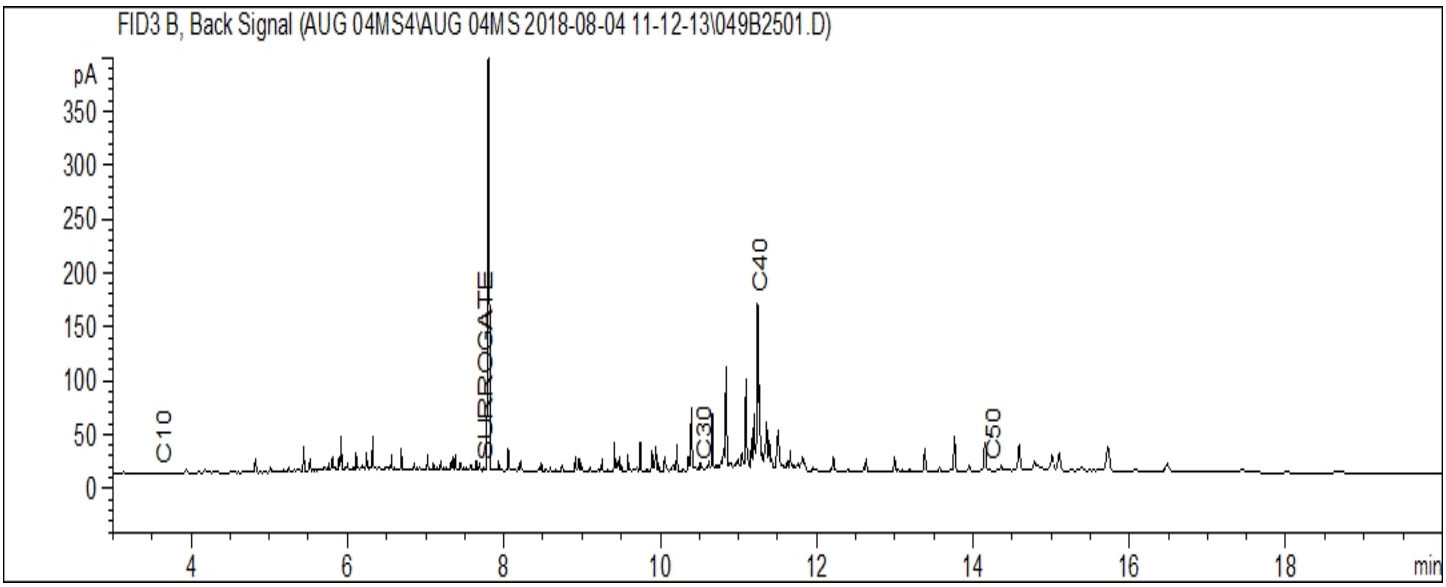


IMAGE016: 9442766, EX18-028



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Chromatogram Image

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE017: 9442767, EX18-029

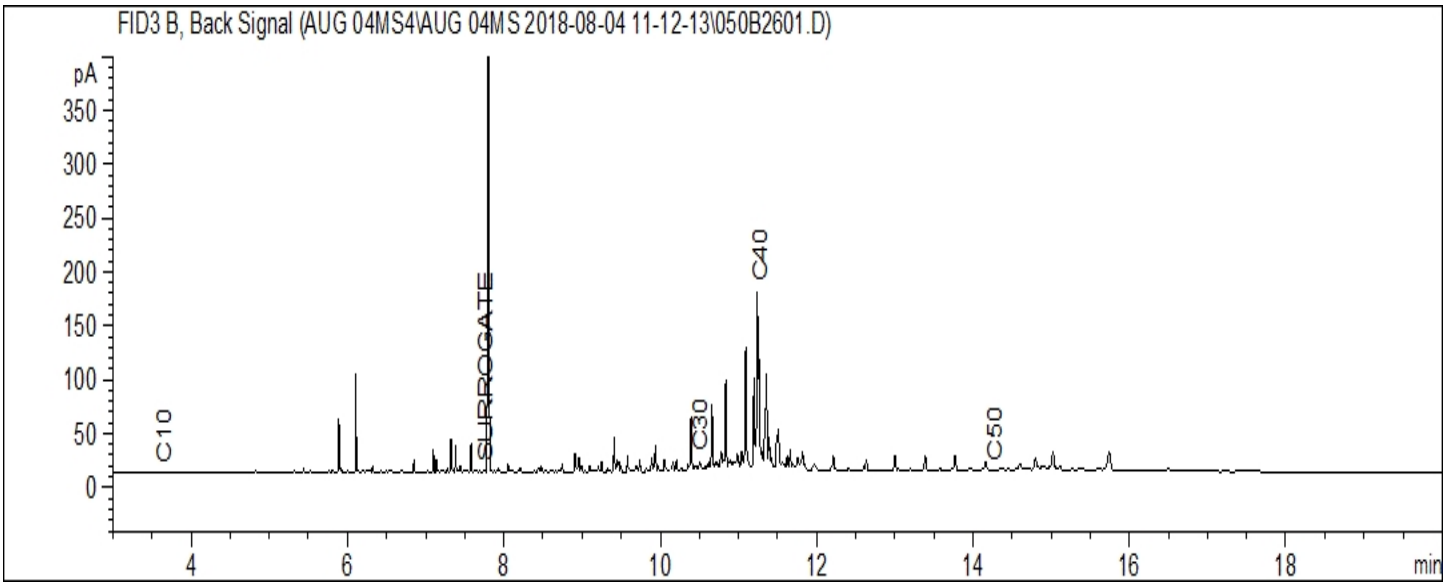
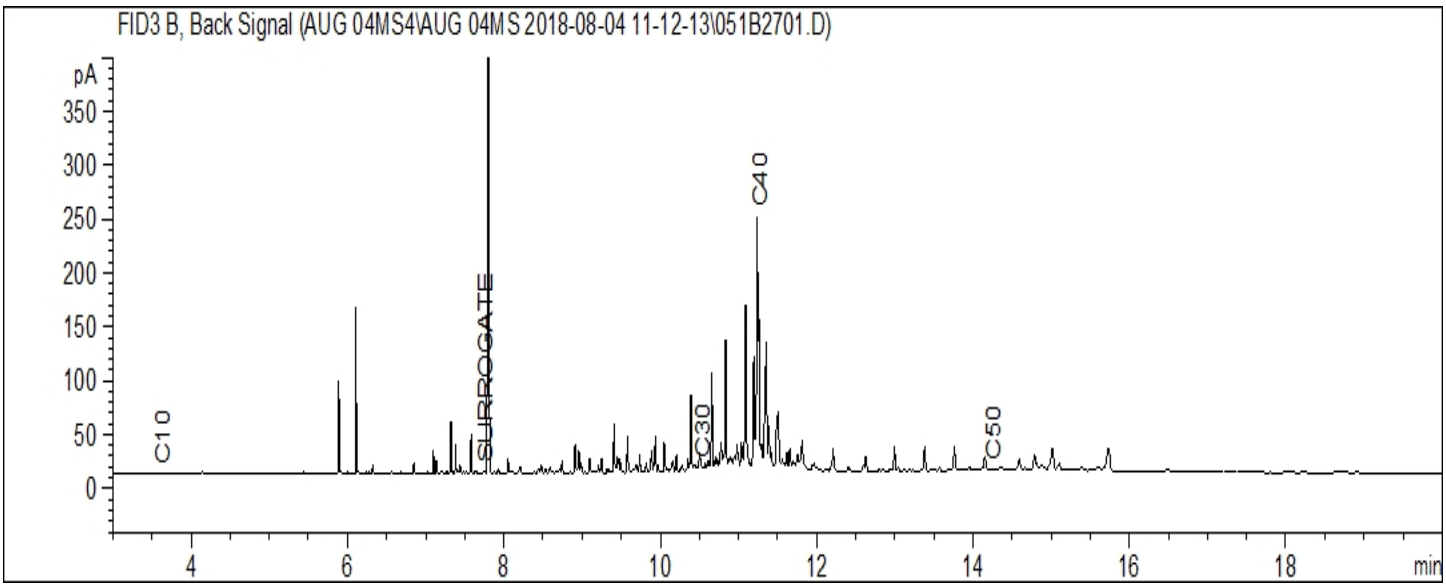


IMAGE018: 9442768, EX18-R029



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CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE019: 9442769, EX18-030

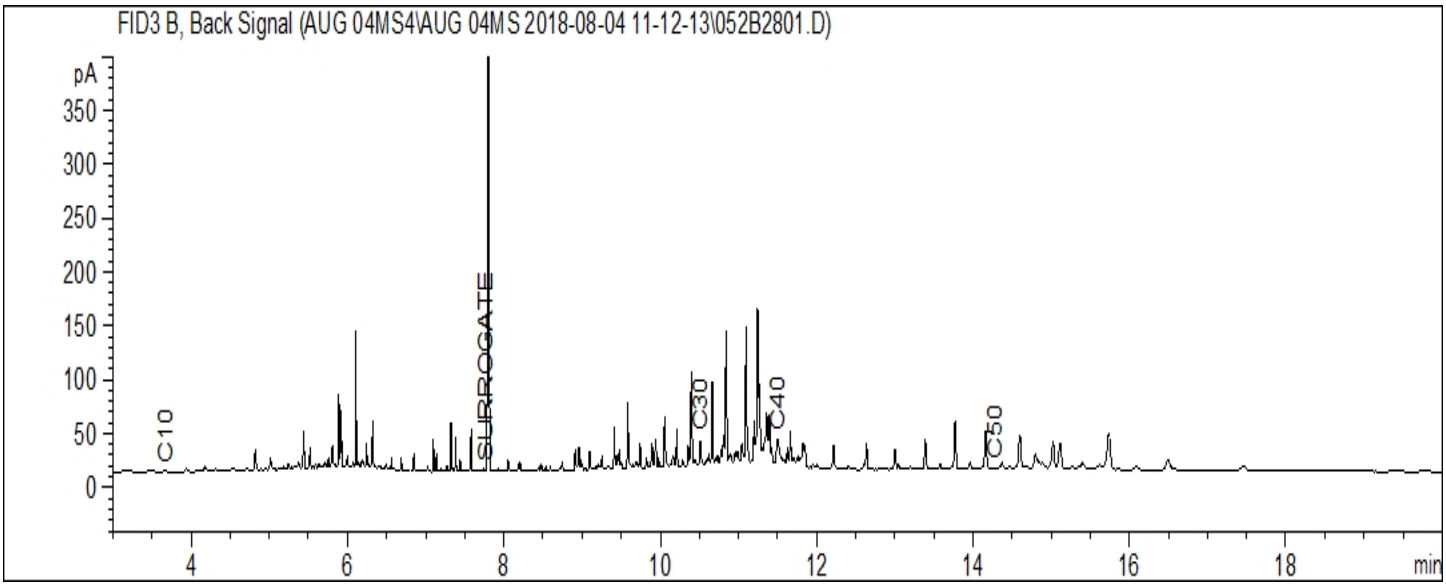
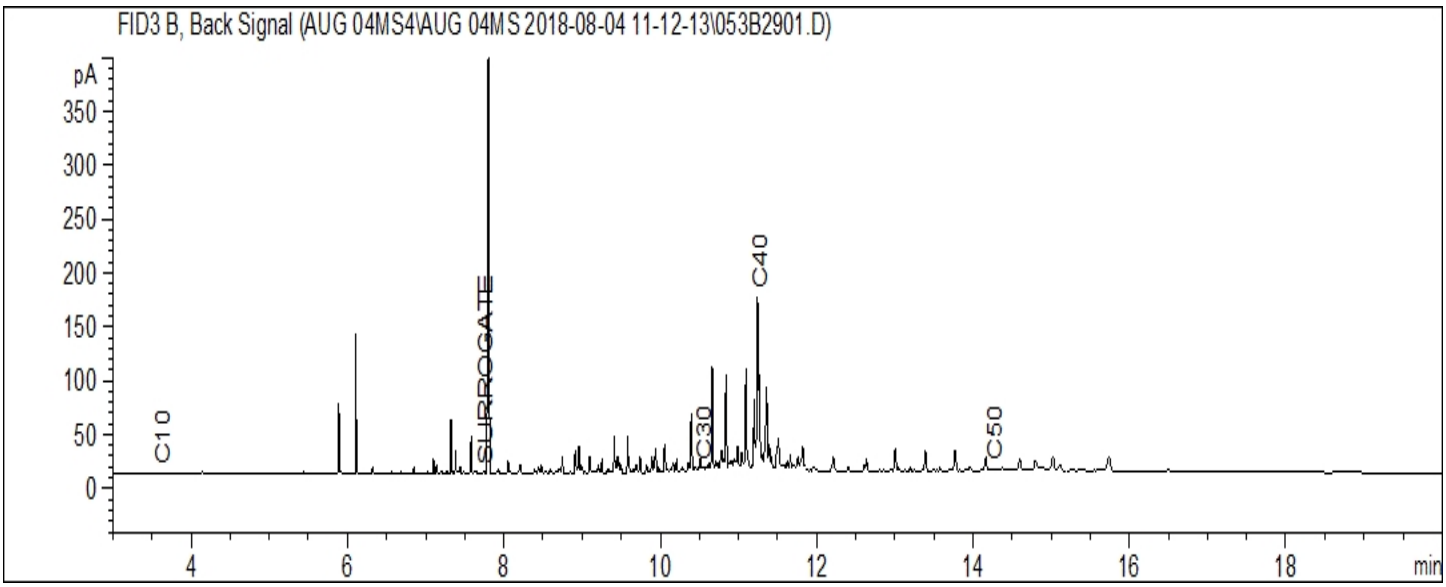


IMAGE020: 9442770, EX18-031



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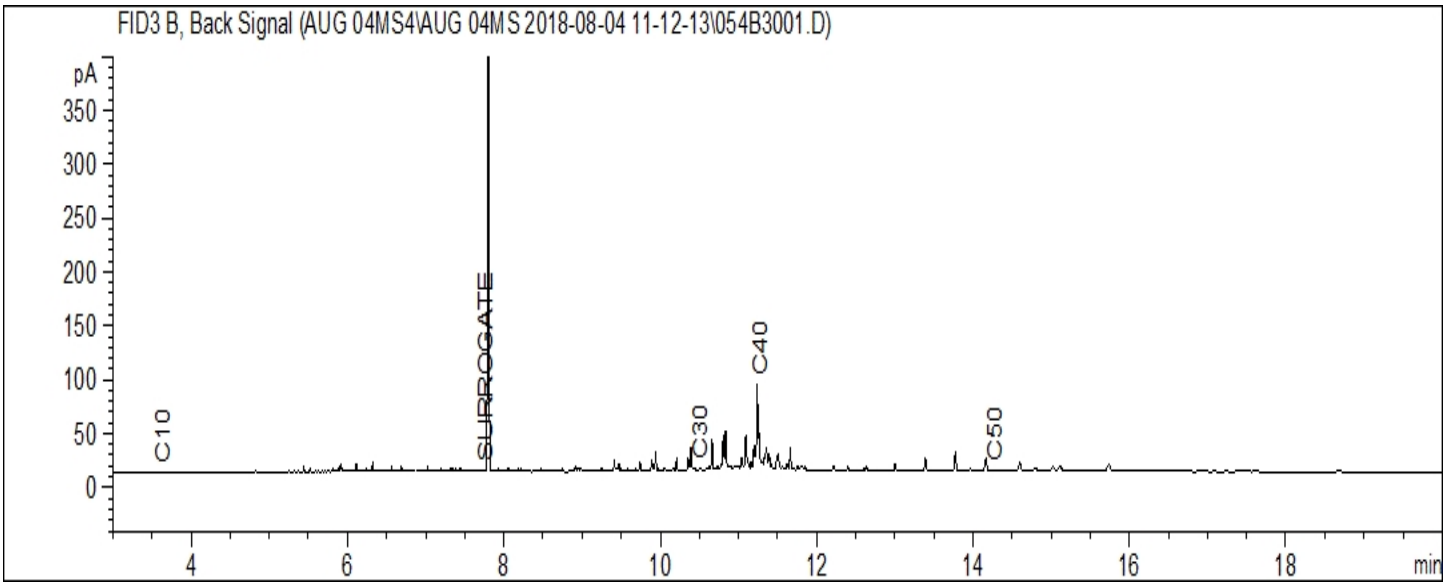
CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E369461

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

IMAGE021: 9442771, EX18-032



AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
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Laboratory Use Only
Arrival Temperature: 4.8°C
AGAT Job Number: 18E369461
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500-2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By:

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: I02018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
☒ Multiple Samples Per Page
☐ Export

'18 AUG 01 11:02

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☐ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	BTEX/F1-F4 + chromium				HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9442739	BH18-01@ 0-0.3		July 29/18	Soil														X	X				
2	753	BH18-01@ 0.6-0.9																	X	X				
3	754	BH18-02@ 0-0.3																	X	X				
4	755	BH18-02@ 0.3-0.6																	X	X				
5	756	BH18-03@ 0-0.3																	X	X				
6	757	BH18-03@ 0.6-0.9																	X	X				
7	758	BH18-04@ 0.3-0.6																	X	X				
8	759	BH18-04@ 0.6-0.9																	X	X				
9	760	BH18-04R@ 0.3-0.6																	X	X				
10	761	BH18-05@ 0-0.3																	X	X				

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	July 30/18 16:00	Jason Trasmonte	1 Aug. 18 1102H

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 3

N°: AB 090054

Document ID: DIV-50-1507.005.

Date Revised: May 10, 2018

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Chain of Custody Record

18E369461

Report to:

Company: IEG Consultants

Same as COC#: 090054

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	BTEX/F1-F4 + chroms	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9442762	BH18-05 @ 0.3-0.6	soil	July 29/18		3		X									X			
763	EX18-025	↓	July 30/18		3		X												
764	EX18-026				3		X												
765	EX18-027				3		X												
766	EX18-028				3		X												
767	EX18-029				3		X												
768	EX18-RA[illegible]R029				3		X												
769	EX18-030				3		X												
770	EX18-031				3		X												
771	EX18-032				3		X												
772	EX18-033				3		X												
773	WR2-004				2		X												
774	WR2-005				2		X												
775	WR5-003				2		X												
776	WR5-004				2		X												
777	WR5-005				2		X												
778	WR6-001				2		X												
779	WR6-002				2		X												
780	WR6-003				2		X												
781	WR6-004				2		X												
782	WR6-005				2		X												
783	WR7-001				2		X												
784	WR7-002				2		X												
785	WR7-003				2		X												
786	WR7-004	↓	↓		2		X												

18 AUG 01 11:02

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem	July 30/18 16:00	J. Trasmonte	1 Aug-18 1102H

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

N°: AB 039587 A

Document ID: DIV-50-1507.002.
Date Revised: December 8th, 2013

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Calgary, Alberta
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webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

18E369461

Report to:

Company: IEG Consultants

Same as COC#: 090054

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^{6} ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐							HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9442787	WR7-005	Soil	July 30/18		2		X																
788	~~WR7-R004~~ WR7-R004				2		X									'18 AUG 01 11:02							
789	WR8-001				2		X																
790	WR8-002				2		X																
791	WR8-003				2		X																
792	WR8-004				2		X																
793	WR8-005				2		X																
794	~~WR14-001~~ WR14-001				2		X																
795	WR14-002				2		X																
796	WR14-003				2		X																
797	WR14-004				2		X																
798	WR14-005				2		X																

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time		
Stephanie Hannem	July 30/18 16:00	J. Trasmonte	1 Aug. 18 1102H	Pink Copy - Client	Page 3 of 3
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time	Yellow Copy - AGAT	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time	White Copy- AGAT	N°: AB 039588 A

Document ID: DIV-50-1507.002

Date Revised: December 8th, 2013

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

4.8°C

RECEIVING BASICS - Shipping

Company/Consultant: IEG Consultants

Courier: Canadian North (Prepaid) Collect

Waybill# 518 - YEV - 1034819 2

Branch (EDM) GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: X

Hydrocarbons: Earliest Expiry Terracore

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 5.3 + 5.2 + 5.1 = 5.2 °C

2 (Bottle/Jar) 4.8 + 4.1 + 4.4 = 4.4 °C

3 (Bottle/Jar)___+___+___=____ °C

4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C

6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C

8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C

10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E369461

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial____

General Comments: sample 780B - Jar rec'd empty. Duplicate for BTEX/F1-F4 Smpls 773 to 798 - were not sampled with methanol field stabilization. BTEX/F1-F4 to be taken from jars.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-10348192

Shipper's Name and Address / Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Emise par

Canadian North: 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont origineaux et ont la meme validité.

Consignee's Name and Address / Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILTY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIREE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables **KLO100CW**

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé

Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	CANADIAN NORTH				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur déclarée pour la transport	Declared value for Customs Valeur déclarée pour la douane
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination: **Edmonton**

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance / Montant de lassurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition

HFPU
KEEP COOL

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
2	42	K	42	7.57		$317.94	GAD	Soil Samples 60cm x 34cm x 70cm
2	42		**42**			**$317.94**		

Weight Charge **Prepaid / Porte payé** **$317.94**	Taxation au poids **Collect / Port dû**
Valuation Charge	Taxation à la valeur
Tax **$21.04**	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier **$102.89**	Total des autres frais dûs au
Total Prepaid / Total port payé **$441.87**	Total collect / Total port dû
For Carrier's User only at Destination Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée

Other Charges / Autres frais

5T Fuel Surcharge = 79.49, 5T Nav Can Surcharge = 15.90, ACS Screening Fee = 7.50, GST/HST = 21.04

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

Executed on (Date) / Fait le (Date): 31 Jul 2018 at / à (Place) (Lieu): YEV

Signature of Issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

Total Collect Charges / Total Du

518-YEV-10348192

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E370282

TRACE ORGANICS REVIEWED BY: Jarrod Roberts, Operations Manager

DATE REPORTED: Aug 13, 2018

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E370282

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-04

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		EX18-034	EX18-035	EX18-R035	EX18-036	EX18-037	EX18-038	EX18-039	EX18-040
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-02	2018-08-02	2018-08-02	2018-08-02	2018-08-02	2018-08-02	2018-08-02	2018-08-02
Parameter	Unit	G / S	RDL	9448096	9448097	9448098	9448099	9448100	9448101	9448102	9448103
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.06	0.47	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	10	<10	<10	40	<10	250
C16 - C34 (F3)	mg/kg		10	70	110	130	150	100	180	80	330
C34 - C50 (F4)	mg/kg		10	30	50	50	60	10	70	30	140
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	23	19	16	21	7	31	20	24
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		108	109	107	109	107	109	106	106
Ethylbenzene-d10 (BTEX)	%	50-150		106	90	92	90	93	96	114	122
o-Terphenyl (F2-F4)	%	50-150		67	79	97	86	85	84	86	80

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E370282

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-04

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		EX18-041	EX18-042	EX18-043
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-08-02	2018-08-02	2018-08-02
Parameter	Unit	G / S	RDL	9448104	9448105	9448106
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	430	<10
C16 - C34 (F3)	mg/kg		10	90	90	50
C34 - C50 (F4)	mg/kg		10	40	40	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A
Moisture Content	%		1	19	45	10
Surrogate	Unit	Acceptable Limits				
Toluene-d8 (BTEX)	%	50-150		106	107	107
Ethylbenzene-d10 (BTEX)	%	50-150		108	128	110
o-Terphenyl (F2-F4)	%	50-150		85	86	87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9448096-9448106 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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CANADA T6B 3P9
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FAX (780)462-2490
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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E370282

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1636	9448090	< 0.005	< 0.005	NA	< 0.005	97%	80%	120%	107%	80%	120%	94%	60%	140%
Toluene	1636	9448090	0.14	0.14	NA	< 0.05	93%	80%	120%	103%	80%	120%	88%	60%	140%
Ethylbenzene	1636	9448090	0.08	0.06	28.6%	< 0.01	93%	80%	120%	112%	80%	120%	100%	60%	140%
Xylenes	1636	9448090	0.49	0.41	17.8%	< 0.05	89%	80%	120%	109%	80%	120%	92%	60%	140%
C6 - C10 (F1)	1636	9448090	< 10	< 10	NA	< 10	97%	80%	120%	91%	80%	120%	85%	60%	140%
C10 - C16 (F2)	1334	9448090	210	260	21.3%	< 10	104%	80%	120%	88%	80%	120%	127%	60%	140%
C16 - C34 (F3)	1334	9448090	230	250	8.3%	< 10	101%	80%	120%	92%	80%	120%	124%	60%	140%
C34 - C50 (F4)	1334	9448090	70	80	13.3%	< 10	92%	80%	120%	82%	80%	120%	126%	60%	140%
Moisture Content	1334	9448090	15	13	14.3%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E370282

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature: 3.8°C
AGAT Job Number: 18E370282
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500 - Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By: Kim MacKenzie

Report Information
1. Name: Kim MacKenzie
Email: kmackenzie@klohn.com
2. Name: Stephanie Hannem
Email: shannem@klohn.com
3. Name: Nicole Wills
Email: nwills@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☐ / No ☐
Company: Same as above
Contact:
Address:
Phone: Fax:
PO/AFE#: IO 2718-002
Standing Offer #:

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single ☐ Sample Per Page
Multiple ☒ Samples Per Page
☐ Export

'18 AUG 04 09:54

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS: VIALS/JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	8070 WR9-001		August 2, 2018	Soil		2				X									
2	071 WR9-002					2				X									
3	072 WR9-003					2				X									
4	073 WR9-004					2				X									
5	074 WR9-005					2				X									
6	075 WR9-R005					2				X									
7	076 WR10-001					2				X									
8	077 WR10-002					2				X									
9	078 WR10-003					2				X									
10	079 WR10-004					2				X									

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K.MacKenzie	AUG 2/18 16:30	Jason Trasmonte	4 Aug. 18 0954H

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White Copy- AGAT

Page 1 of 3

N°: AB 090074

AGAT Laboratories

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webearth.agatlabs.com

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Chain of Custody Record

18E370282

Report to:

Company: IEG Consultants

Same as COC#: 090074

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐								HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
080	WR10-005	SOIL	AUG 2,2018		2		X																	
081	WR10A-001				2		X									'18 AUG 04 09:54								
082	WR10A-002				2		X																	
083	WR10A-003				2		X																	
084	WR10A-004				2		X																	
085	WR10A-005				2		X																	
086	WR13-001				2		X																	
087	WR13-002				2		X																	
088	WR13-003				2		X																	
089	WR13-004				2		X																	
090	WR13-005				2		X																	
091	WR12-001				2		X																	
092	WR12-002				2		X																	
093	WR12-003				2		X																	
094	WR12-004				2		X																	
095	WR12-005				2		X																	
096	EX18-034				3		X																	
097	EX18-035				3		X																	
098	EX18-R035				3		X																	
099	EX18-036				3		X																	
100	EX18-037				3		X																	
101	EX18-038				3		X																	
102	EX18-039				3		X																	
103	EX18-040				3		X																	
104	EX18-041				3		X																	

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	AUG 2/18 16:30	J. Trasmonte	4 Aug-18 0424H
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 3

Nº: AB 039570 A

Document ID: DIV-50-1507.002.

Date Revised: December 8th, 2013

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webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

18E370282

Report to:

Company: IEG Consultants

Same as COC#: 090074

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^{6} ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐							HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
105	Ex18-042	Soil	Aug 2, 2018		3		X																
106	Ex18-043	Soil	Aug 2, 2018		3		X									'18 AUG 04 09:54							

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	Aug 2/18 16:30	J. Trasmonte	4 Aug. 18 09:54
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

Page 3 of 3

N°: AB 039586 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

3.8 °C

RECEIVING BASICS - Shipping

Company/Consultant: IEG Consultants

Courier: Canadian North Prepaid Collect

Waybill# 518 - YEV - 10351036

Branch: (EDM) GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: N/A

Hydrocarbons: Earliest Expiry Terracore

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 4.0+4.4+4.2=4.4 °C	2 (Bottle/Jar) 3.3+2.9+3.1=3.1 °C
3 (Bottle/Jar)___+___+___=___ °C	4 (Bottle/Jar)___+___+___=___ °C
5 (Bottle/Jar)___+___+___=___ °C	6 (Bottle/Jar)___+___+___=___ °C
7 (Bottle/Jar)___+___+___=___ °C	8 (Bottle/Jar)___+___+___=___ °C
9 (Bottle/Jar)___+___+___=___ °C	10 (Bottle/Jar)___+___+___=___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E370288

Samples Damaged: (Yes) No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: Extra sample received - 8366AB.

Sample 8073A received cracked - Salvaged & placed in a bigger jar.

Samples 8070 to 095 - Soil samples for BTEX/F1 analysis were not sampled using hermetic sampling or methanol field stabilization.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-10351036

Shipper's Name and Address / Nom et adresse de l'expéditeur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont origineaux et ont la meme validité.

Consignee's Name and Address / Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILTY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ETRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables **KLO100CW**

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé
Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	CANADIAN NORTH				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur declarée pour la transport	Declared value for Customs Valeur declarée pour la douane
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance / Montant de l'assurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance".
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformement aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition
HFPU
KEEP COOL

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
2	40	K	40	7.57		$302.80	GAD	Water Samples 60cm x 34cm x 70cm
2	**40**		**40**			**$302.80**		

Weight Charge **Prepaid / Porte payé** **$302.80**	Taxation au poids **Collect / Port dû**
Valuation Charge	Taxation à la valeur
Tax **$20.06**	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier **$98.34**	Total des autres frais dûs au
Total Prepaid / Total port payé **$421.20**	Total collect / Total port dû
For Carrier's User only at Destination Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée

Other Charges / Autres frais

5T Fuel Surcharge = 75.70, 5T Nav Can Surcharge = 15.14, ACS Screening Fee = 7.50, GST/HST = 20.06

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformement à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

Executed on / Fait le: 03 Aug 2018 (Date) at / à: YEV (Place / Lieu)

Signature of issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

Total Collect Charges / Total Du

518-YEV-10351036

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Accounts Payable

PROJECT: A04012A10

AGAT WORK ORDER: 18E370696

TRACE ORGANICS REVIEWED BY: Jarrod Roberts, Operations Manager

DATE REPORTED: Aug 13, 2018

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E370696

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Accounts Payable

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-07

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		EX18-044	EX18-045	EX18-046	EX18-047
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-04	2018-08-04	2018-08-04	2018-08-04
Parameter	Unit	G / S	RDL	9451587	9451589	9451590	9451591
Benzene	mg/kg		0.005	<0.005	0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	30	20	800
C16 - C34 (F3)	mg/kg		10	30	90	40	60
C34 - C50 (F4)	mg/kg		10	20	60	20	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A
Moisture Content	%		1	11	24	6	16
Surrogate	Unit	Acceptable Limits					
Toluene-d8 (BTEX)	%	50-150		109	108	109	108
Ethylbenzene-d10 (BTEX)	%	50-150		85	82	93	85
o-Terphenyl (F2-F4)	%	50-150		86	88	86	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9451587-9451591 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E370696

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Accounts Payable

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-07

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		WR7A-001	WR7A-002	WR7A-R002	WR7A-003	WR7A-004	WR7A-005	WR15-001	WR15-002
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-04	2018-08-04	2018-08-04	2018-08-04	2018-08-04	2018-08-04	2018-08-04	2018-08-04
Parameter	Unit	G / S	RDL	9451592	9451594	9451595	9451596	9451597	9451598	9451604	9451605
Benzene	mg/kg		0.005	<0.005	0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.008
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	10	10	30	20	<10	80	20
C16 - C34 (F3)	mg/kg		10	40	50	50	50	40	50	250	100
C34 - C50 (F4)	mg/kg		10	30	20	20	20	20	40	130	60
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	7	8	7	7	6	11	16	6
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		109	109	109	110	110	109	109	110
Ethylbenzene-d10 (BTEX)	%	50-150		93	96	92	95	96	92	102	90
o-Terphenyl (F2-F4)	%	50-150		88	93	97	106	102	92	110	128

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E370696

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Accounts Payable

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-07

DATE REPORTED: 2018-08-08

		SAMPLE DESCRIPTION:		WR15-003	WR15-004	WR15-005	WR15-R005
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-04	2018-08-04	2018-08-04	2018-08-04
Parameter	Unit	G / S	RDL	9451606	9451607	9451608	9451626
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	90	20	30	30
C16 - C34 (F3)	mg/kg		10	90	90	50	60
C34 - C50 (F4)	mg/kg		10	50	70	30	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A
Moisture Content	%		1	8	17	12	11
Surrogate	Unit	Acceptable Limits					
Toluene-d8 (BTEX)	%	50-150		109	109	109	109
Ethylbenzene-d10 (BTEX)	%	50-150		96	102	99	99
o-Terphenyl (F2-F4)	%	50-150		102	119	107	111

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9451592-9451626 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E370696

PROJECT: A04012A10

ATTENTION TO: Accounts Payable

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1337	9451587	<0.005	0.007	NA	< 0.005	99%	80%	120%	80%	80%	120%	88%	60%	140%
Toluene	1337	9451587	<0.05	<0.05	NA	< 0.05	95%	80%	120%	80%	80%	120%	86%	60%	140%
Ethylbenzene	1337	9451587	<0.01	<0.01	NA	< 0.01	95%	80%	120%	85%	80%	120%	96%	60%	140%
Xylenes	1337	9451587	<0.05	<0.05	NA	< 0.05	91%	80%	120%	83%	80%	120%	88%	60%	140%
C6 - C10 (F1)	1337	9451587	<10	<10	NA	< 10	99%	80%	120%	84%	80%	120%	72%	60%	140%
C10 - C16 (F2)	1056	9451587	<10	10	NA	< 10	105%	80%	120%	86%	80%	120%	77%	60%	140%
C16 - C34 (F3)	1056	9451587	30	50	NA	< 10	105%	80%	120%	99%	80%	120%	87%	60%	140%
C34 - C50 (F4)	1056	9451587	20	30	NA	< 10	98%	80%	120%	103%	80%	120%	91%	60%	140%
Moisture Content	1056	9451587	11	11	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

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EDMONTON, ALBERTA
CANADA T6B 3P9
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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E370696

PROJECT: A04012A10

ATTENTION TO: Accounts Payable

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E370696
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500-2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By: Kim MacKenzie

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: IO2018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
☐ Single Sample Per Page
☑ Multiple Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50 ☑ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	18 AUG 07 16:53	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1 9451587	EX18-044	0.6	AUG 4, 2018	SOIL		3			X										
2 589	EX18-045	0.6	↓	↓		3			X										
3 590	EX18-046	0.6				3			X										
4 591	EX18-047	0.6	AUG 4, 2018			3			X										
5 592	WRTA-001	-	AUG 5, 2018			2			X										
6 594	WRTA-002	-				2			X										
7 595	WRTA-R002	-				2			X										
8 596	WRTA-003	-				2			X										
9 597	WRTA-004	-				2			X										
10 598	WRTA-005	-	↓	↓		2			X										

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Kim MacKenzie K. MacKenzie	AUG 5/18 19:00		07 AUG 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page 1 of 2

N°: AB 090055

Document ID: DIV-50-1507.005

Date Revised: May 10, 2018

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090055

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9451599	WR11-001	SOIL	AUG 5, 2018		2		X											
600	WR11-002	↓	↓		2		X											
601	WR11-003				2		X											
602	WR11-004				2		X											
603	WR11-005				2		X											
604	WR15-001				2		X											
605	WR15-002				2		X											
606	WR15-003				2		X											
607	WR15-004				2		X											
608	WR15-005				2		X											
626	WR15-R005	↓	↓															

10 AUG 07 10:53

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	AUG 5/18 19:00		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page _____ of _____

N°: AB 039568 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: IEG

Courier: GNORTH — Prepaid / Collect

Waybill# 518 - 32304604

Branch: EDM / GP / FN / FM / RD / VAN / LYD / FSJ / EST / Other:

If multiple sites were submitted at once: Yes / No

Custody Seal Intact: Yes / No / NA

TAT: <24hr / 24-48hr / 48-72hr / Reg / Other

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes / No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: /

Hydrocarbons: Earliest Expiry TERRACORES

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES / NO Precaution Taken:

Legal Samples: Yes / No

International Samples: Yes / No

Tape Sealed: Yes / No

Coolant Used: Icepack / Bagged Ice / Free Ice / Free Water / None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 2.8 + 1.7 + 2.1 = 2.2 °C

2 (Bottle/Jar)___+___+___=___°C

3 (Bottle/Jar)___+___+___=___°C

4 (Bottle/Jar)___+___+___=___°C

5 (Bottle/Jar)___+___+___=___°C

6 (Bottle/Jar)___+___+___=___°C

7 (Bottle/Jar)___+___+___=___°C

8 (Bottle/Jar)___+___+___=___°C

9 (Bottle/Jar)___+___+___=___°C

10 (Bottle/Jar)___+___+___=___°C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E370696

Samples Damaged: Yes / No If YES why?

No Bubble Wrap / Frozen / Courier

Other:

Account Project Manager: Chantal Seeney have they been notified of the above issues: Yes / No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: No analysis checked off for sample WR15-R005, No Terracore vials for sample WR7A-001 to WR15-R005

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-32304694

Shipper's Name and Address / Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont originaux et ont la meme validité.

Consignee's Name and Address / Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILTY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables **KLO100CW**

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé
Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	CANADIAN NORTH				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur déclarée pour la transport	Declared value for Customs Valeur déclarée pour le douane
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lassurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition
Hold & Notify

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'larticle de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
1	22	K	22	7.57		$166.54	GAD	Soil Samples (non-haz) 60cm x 33cm x 35cm
1	**22**		**22**			**$166.54**		

Weight Charge / Prepaid / Porte payé	Taxation au poids / Collect / Port dû
$166.54	
Valuation Charge	Taxation à la valeur
Tax **$11.20**	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier **$57.47**	Total des autres frais dûs au
Total Prepaid / Total port payé **$235.21**	Total collect / Total port dû

Other Charges / Autres frais

5T Fuel Surcharge = 41.64, 5T Nav Can Surcharge = 8.33, ACS Screening Fee = 7.50, GST/HST = 11.20

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

Executed on (Date) 06 Aug 2018 at (Place) YEV
Fait le (Date) à (Lieu)

Signature of Issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

For Carrier's User only at Destination
Réservé au transporteur à destination

Charges at Destination / Frais à l'arrivée

Total Collect Charges / Total Du

518-YEV-32304694

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E372993

TRACE ORGANICS REVIEWED BY: Melinda Guay, Technical Reviewer

DATE REPORTED: Aug 17, 2018

PAGES (INCLUDING COVER): 20

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		EX18-048	EX18-049	EX18-050	EX18-R050	EX18-051	EX18-052	EX18-053	EX18-066
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-08	2018-08-08	2018-08-08	2018-08-08	2018-08-08	2018-08-08	2018-08-08	2018-08-09
Parameter	Unit	G / S	RDL	9467741	9467742	9467743	9467744	9467745	9467746	9467747	9467748
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.40	0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	140
C16 - C34 (F3)	mg/kg		10	20	10	20	10	<10	130	<10	280
C34 - C50 (F4)	mg/kg		10	20	<10	10	<10	<10	70	<10	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	15	14	12	10	10	13	12	5
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	97	97	97	98	98	98	98
Ethylbenzene-d10 (BTEX)	%	50-150		114	103	102	114	105	99	104	99
o-Terphenyl (F2-F4)	%	50-150		94	93	111	94	94	95	100	92

Certified By:

AGAT Laboratories

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CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		EX18-067	EX18-068	EX18-069	EX18-R067	EX18-070	EX18-071	EX18-072	EX18-073
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09
Parameter	Unit	G / S	RDL	9467749	9467750	9467752	9467753	9467754	9467755	9467756	9467757
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	10	20	20	30	90	30	20	110
C16 - C34 (F3)	mg/kg		10	60	160	60	70	200	100	210	190
C34 - C50 (F4)	mg/kg		10	30	70	20	40	80	40	130	90
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	15	26	10	11	21	25	39	29
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	97	98	97	98	97	98	98
Ethylbenzene-d10 (BTEX)	%	50-150		93	122	89	100	122	115	126	111
o-Terphenyl (F2-F4)	%	50-150		96	94	94	102	100	98	95	91

Certified By:

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CANADA T6B 3P9
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FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		EX18-074	EX18-054	EX18-055	EX18-056	EX18-057	EX18-058	EX18-059	EX18-060
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10
Parameter	Unit	G / S	RDL	9467758	9467828	9467829	9467830	9467833	9467834	9467835	9467837
Benzene	mg/kg		0.005	<0.005	0.049	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.72	0.06	<0.05	0.12	0.07	0.29	0.12
Ethylbenzene	mg/kg		0.01	<0.01	0.42	<0.01	<0.01	<0.01	0.03	<0.01	0.03
Xylenes	mg/kg		0.05	<0.05	3.13	<0.05	<0.05	<0.05	0.33	<0.05	0.28
C6 - C10 (F1)	mg/kg		10	<10	70	<10	<10	<10	30	<10	30
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	70	<10	<10	<10	30	<10	30
C10 - C16 (F2)	mg/kg		10	<10	850	490	770	660	1790	160	700
C16 - C34 (F3)	mg/kg		10	60	760	740	960	910	1550	240	590
C34 - C50 (F4)	mg/kg		10	20	70	150	160	170	220	50	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	35	25	27	29	28	32	14	20
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	111	105	105	106	106	104	108
Ethylbenzene-d10 (BTEX)	%	50-150		124	120	121	120	127	128	96	114
o-Terphenyl (F2-F4)	%	50-150		92	90	95	92	93	90	88	89

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		EX18-061	EX18-062	EX18-063	EX18-064	EX18-065
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10
Parameter	Unit	G / S	RDL	9467838	9467842	9467846	9467847	9467848
Benzene	mg/kg		0.005	0.005	<0.005	0.007	<0.005	<0.005
Toluene	mg/kg		0.05	0.19	0.06	0.07	0.11	<0.05
Ethylbenzene	mg/kg		0.01	0.12	<0.01	0.06	0.05	<0.01
Xylenes	mg/kg		0.05	1.11	0.07	0.86	0.53	0.07
C6 - C10 (F1)	mg/kg		10	50	10	90	30	20
C6 - C10 (F1 minus BTEX)	mg/kg		10	50	10	90	30	20
C10 - C16 (F2)	mg/kg		10	1510	800	1690	620	940
C16 - C34 (F3)	mg/kg		10	700	610	550	380	820
C34 - C50 (F4)	mg/kg		10	30	70	20	30	100
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA
Moisture Content	%		1	28	17	24	22	18
Surrogate	Unit	Acceptable Limits						
Toluene-d8 (BTEX)	%	50-150		108	106	114	106	105
Ethylbenzene-d10 (BTEX)	%	50-150		123	110	122	106	104
o-Terphenyl (F2-F4)	%	50-150		86	89	98	87	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9467741-9467848 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR19-001	WR19-002	WR19-003	WR19-R002	WR19-004	WR19-005	WR19-006	WR19-007
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09
Parameter	Unit	G / S	RDL	9467759	9467762	9467763	9467764	9467765	9467766	9467767	9467768
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	180	140	40	120	60	60	140	100
C16 - C34 (F3)	mg/kg		10	210	190	100	210	130	160	260	270
C34 - C50 (F4)	mg/kg		10	40	40	40	60	40	50	50	60
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	13	13	12	13	10	11	14	14
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	98	97	98	99	98	98	98
Ethylbenzene-d10 (BTEX)	%	50-150		104	104	102	107	107	112	108	106
o-Terphenyl (F2-F4)	%	50-150		95	96	93	80	86	86	89	90

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR19-008	WR19-009	WR19-010	WR22-001	WR22-002	WR22-003	WR22-004	WR22-005
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09
Parameter	Unit	G / S	RDL	9467769	9467770	9467771	9467772	9467773	9467774	9467775	9467776
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.53
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	110	120	120	500	110	250	170	30
C16 - C34 (F3)	mg/kg		10	250	280	200	460	230	280	250	120
C34 - C50 (F4)	mg/kg		10	50	50	40	40	90	70	70	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	12	13	14	14	12	13	14	15
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	98	97	96	97	97	94	97
Ethylbenzene-d10 (BTEX)	%	50-150		105	112	111	107	113	111	92	120
o-Terphenyl (F2-F4)	%	50-150		91	87	86	86	87	82	84	82

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FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR22-006	WR22-007	WR22-008	WR22-R003	WR18-001	WR18-002	WR18-003	WR18-004
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09
Parameter	Unit	G / S	RDL	9467777	9467778	9467788	9467789	9467790	9467791	9467792	9467793
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	200	190	120	240	240	300	420	140
C16 - C34 (F3)	mg/kg		10	220	250	200	300	340	420	560	200
C34 - C50 (F4)	mg/kg		10	50	60	50	80	60	60	80	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	16	20	17	16	11	11	13	17
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		95	96	97	97	91	97	97	104
Ethylbenzene-d10 (BTEX)	%	50-150		101	103	116	108	92	105	106	111
o-Terphenyl (F2-F4)	%	50-150		82	86	86	85	92	90	90	87

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR18-005	WR18-006	WR18-007	WR18-008	WR18-R008	WR21-001	WR21-002	WR21-003
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-09	2018-08-10	2018-08-10	2018-08-10
Parameter	Unit	G / S	RDL	9467794	9467795	9467796	9467797	9467798	9467853	9467854	9467857
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	470	190	310	790	550	130	330	120
C16 - C34 (F3)	mg/kg		10	370	200	380	490	440	240	440	210
C34 - C50 (F4)	mg/kg		10	40	20	40	40	50	40	50	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	19	13	11	14	14	13	17	15
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		104	105	105	105	104	102	104	108
Ethylbenzene-d10 (BTEX)	%	50-150		116	109	116	112	109	120	107	123
o-Terphenyl (F2-F4)	%	50-150		86	88	92	89	91	90	93	74

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CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR21-004	WR21-005	WR21-007	WR23-001	WR23-002	WR23-003	WR23-004	WR23-005
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10	2018-08-10
Parameter	Unit	G / S	RDL	9467858	9467859	9467861	9467862	9467863	9467864	9467865	9467866
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	320	420	260	340	420	270	310	260
C16 - C34 (F3)	mg/kg		10	360	450	310	400	500	310	460	330
C34 - C50 (F4)	mg/kg		10	20	50	60	50	60	30	70	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	16	15	13	11	15	16	16	13
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		110	107	109	107	108	108	108	108
Ethylbenzene-d10 (BTEX)	%	50-150		105	124	118	133	128	145	140	124
o-Terphenyl (F2-F4)	%	50-150		74	82	80	76	78	75	80	78

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EDMONTON, ALBERTA
CANADA T6B 3P9
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Certificate of Analysis

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-13

DATE REPORTED: 2018-08-16

		SAMPLE DESCRIPTION:		WR23-006	WR23-007	WR23-008
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-08-10	2018-08-10	2018-08-10
Parameter	Unit	G / S	RDL	9467867	9467868	9467869
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	280	300	200
C16 - C34 (F3)	mg/kg		10	410	440	230
C34 - C50 (F4)	mg/kg		10	70	70	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA
Moisture Content	%		1	15	13	3
Surrogate	Unit	Acceptable Limits				
Toluene-d8 (BTEX)	%	50-150		109	108	107
Ethylbenzene-d10 (BTEX)	%	50-150		123	128	144
o-Terphenyl (F2-F4)	%	50-150		77	90	60

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9467759-9467869 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
C10 - C16 (F2)	1338	9467743	<10	<10	NA	< 10	105%	80%	120%	105%	80%	120%	106%	60%	140%
C16 - C34 (F3)	1338	9467743	24	15	NA	< 10	103%	80%	120%	111%	80%	120%	113%	60%	140%
C34 - C50 (F4)	1338	9467743	15	<10	NA	< 10	93%	80%	120%	95%	80%	120%	96%	60%	140%
Moisture Content	1338	9467743	11	12	8.7%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1784	9467743	<0.005	<0.005	NA	< 0.005	85%	80%	120%	84%	80%	120%	98%	60%	140%
Toluene	1784	9467743	<0.05	<0.05	NA	< 0.05	84%	80%	120%	83%	80%	120%	98%	60%	140%
Ethylbenzene	1784	9467743	<0.01	<0.01	NA	< 0.01	85%	80%	120%	84%	80%	120%	98%	60%	140%
Xylenes	1784	9467743	<0.05	<0.05	NA	< 0.05	86%	80%	120%	80%	80%	120%	101%	60%	140%
C6 - C10 (F1)	1784	9467743	<10	<10	NA	< 10	95%	80%	120%	94%	80%	120%	120%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1785	9467768	<0.005	<0.005	NA	< 0.005	86%	80%	120%	84%	80%	120%	97%	60%	140%
Toluene	1785	9467768	<0.05	<0.05	NA	< 0.05	85%	80%	120%	82%	80%	120%	92%	60%	140%
Ethylbenzene	1785	9467768	<0.01	<0.01	NA	< 0.01	85%	80%	120%	82%	80%	120%	86%	60%	140%
Xylenes	1785	9467768	<0.05	<0.05	NA	< 0.05	87%	80%	120%	82%	80%	120%	87%	60%	140%
C6 - C10 (F1)	1785	9467768	<10	<10	NA	< 10	95%	80%	120%	119%	80%	120%	123%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1644	9467838	0.005	0.008	NA	< 0.005	90%	80%	120%	86%	80%	120%	91%	60%	140%
Toluene	1644	9467838	0.19	0.19	NA	< 0.05	87%	80%	120%	86%	80%	120%	87%	60%	140%
Ethylbenzene	1644	9467838	0.12	0.11	8.7%	< 0.01	88%	80%	120%	91%	80%	120%	96%	60%	140%
Xylenes	1644	9467838	1.11	1.05	5.6%	< 0.05	86%	80%	120%	83%	80%	120%	85%	60%	140%
C6 - C10 (F1)	1644	9467838	50	50	0.0%	< 10	95%	80%	120%	91%	80%	120%	74%	60%	140%
C10 - C16 (F2)	1233	9467838	1510	1720	13.0%	< 10	101%	80%	120%	103%	80%	120%	93%	60%	140%
C16 - C34 (F3)	1233	9467838	700	800	13.3%	< 10	109%	80%	120%	98%	80%	120%	96%	60%	140%
C34 - C50 (F4)	1233	9467838	30	40	NA	< 10	109%	80%	120%	82%	80%	120%	77%	60%	140%
Moisture Content	1233	9467838	28	28	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1901	9467857	<0.005	<0.005	NA	< 0.005	80%	80%	120%	81%	80%	120%	86%	60%	140%
Toluene	1901	9467857	<0.05	<0.05	NA	< 0.05	86%	80%	120%	81%	80%	120%	88%	60%	140%
Ethylbenzene	1901	9467857	<0.01	<0.01	NA	< 0.01	94%	80%	120%	103%	80%	120%	108%	60%	140%
Xylenes	1901	9467857	<0.05	<0.05	NA	< 0.05	104%	80%	120%	98%	80%	120%	103%	60%	140%
C6 - C10 (F1)	1901	9467857	<10	<10	NA	< 10	93%	80%	120%	84%	80%	120%	80%	60%	140%
C10 - C16 (F2)	777	9467857	120	90	28.6%	< 10	109%	80%	120%	111%	80%	120%	105%	60%	140%

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
C16 - C34 (F3)	777	9467857	210	190	10.0%	< 10	113%	80%	120%	119%	80%	120%	120%	60%	140%
C34 - C50 (F4)	777	9467857	40	50	NA	< 10	110%	80%	120%	87%	80%	120%	87%	60%	140%
Moisture Content	777	9467857	15	12	22.2%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

C10 - C16 (F2)	1339	9467768	100	80	22.2%	< 10	118%	80%	120%	98%	80%	120%	94%	60%	140%
C16 - C34 (F3)	1339	9467768	270	240	11.8%	< 10	114%	80%	120%	104%	80%	120%	102%	60%	140%
C34 - C50 (F4)	1339	9467768	60	50	18.2%	< 10	111%	80%	120%	88%	80%	120%	87%	60%	140%
Moisture Content	1339	9467768	14	14	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E372993

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature: 1.7°C
AGAT Job Number: 18E372993
Date and Time: 18 AUG 13 09:33

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500 - 2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: AC4012 A10
Sampled By: Kim MacKenzie

Report Information
1. Name: Stephanie Hanniem
Email: Shanniem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#: I02018-0002
Standing Offer #:

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☑ Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☑ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9467741 EX18-048	0.6	AUG 8/18	Soil		3				X									
2	742 EX18-049					3				X									
3	743 EX18-050					3				X									
4	744 EX18-RD50					3				X									
5	745 EX18-051					3				X									
6	746 EX18-052					3				X									
7	747 EX18-053					3				X									
8	748 EX18-066	0.6	AUG 9/18			3				X									
9	749 EX18-067	0.6				3				X									
10	750 EX18-068	0.6				3				X									

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Kim MacKenzie K. MacKenzie	AUG 11/18 09:30		8/13/2018

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page 1 of 4
N°: AB 090056

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
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Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090056

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	18 AUG 13 09:32	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9467752	EX18-069	Soil	AUG 9/18		3		X												
753	EX18-R069				3		X												
754	EX18-070				3		X												
755	EX18-071				3		X												
756	EX18-072				3		X												
757	EX18-073				3		X												
758	EX18-074				3		X												
759	WR19-001				2		X												
762	WR19-002				2		X												
763	WR19-003				2		X												
764	WR19-R002				2		X												
765	WR19-004				2		X												
766	WR19-005				2		X												
767	WR19-006				2		X												
768	WR19-007				2		X												
769	WR19-008				2		X												
770	WR19-009				2		X												
771	WR19-010				2		X												
772	WR22-001				2		X												
773	WR22-002				2		X												
774	WR22-003				2		X												
775	WR22-004				2		X												
776	WR22-005				2		X												
777	WR22-006				2		X												
778	WR22-007				2		X												

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie	AUG 11/18 09:3		8/13/2018
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

Page 2 of 4

N°: AB 039569 A

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Calgary, Alberta
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Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090056

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	Aug 11/18 09:30	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9467788	WR22-008	SOIL	AUG 9/18		2		X												
789	WR22-R003				2		X												
790	WR18-001				2		X												
791	WR18-002				2		X												
792	WR18-003				2		X												
793	WR18-004				2		X												
794	WR18-005				2		X												
795	WR18-006				2		X												
796	WR18-007				2		X												
797	WR18-008				2		X												
798	WR18-R008				2		X												
828	EX18-054		AUG 10/18		3		X												
829	EX18-055				3		X												
830	EX18-056				3		X												
833	EX18-057				3		X												
834	EX18-058				3		X												
835	EX18-059				3		X												
837	EX18-060				3		X												
838	EX18-061				3		X												
842	EX18-062				3		X												
846	EX18-063				3		X												
847	EX18-064				3		X												
848	EX18-065				3		X												
853	WR21-001				2		X												
854	WR21-002				2		X												

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	AUG 11/18 09:30	[signature]	8/13/2018
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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Page 3 of 4

N°: AB 039585 A

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090056

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	IEG Aug 12 WR23	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9467 857	WR21-003	Soil	AUG 10/18		2		X												
858	WR21-004				2		X												
859	WR21-005				2		X												
860	WR21-006				2		X												
861	WR21-007				2		X												
862	WR23-001				2		X												
863	WR23-002				2		X												
864	WR23-003				2		X												
865	WR24-004				2		X												
866	WR24-005				2		X												
867	WR24-006				2		X												
868	WR24-007				2		X												
869	WR24-008				2		X												

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K.MacKenzie	AUG 11/18 09:30	[illegible]	8/13/2018
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

Page 4 of 4.

Nº: AB 039571 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: EGG Consultants

Courier: Canadian North - Enuvik Prepaid Collect

Waybill# 518-YEV-10755715

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 3

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received 1.7°C

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 1.3+1.3+1.3=1.3 °C 2 (Bottle/Jar) 1.1+1.1+1.1=1.1 °C

3 (Bottle/Jar) 2.3+2.9+2.9=2.7 °C 4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C 6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C 8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C 10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18637299 3

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

* Subcontracted Analysis (See CPM)

CANADIAN NORTH CARGO

518-YEV-10355715

Shipper's Name and Address
Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Consignee's Name and Address
Nom el adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont origineaux et ont la meme validité.

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILTY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables

KLO100CW

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé

Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par	Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur déclarée pour le transport	Declared value for Customs Valeur déclarée pour la douane
YEG	CANADIAN NORTH					CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lássurance

INSURANCE – If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE – si le transporteur propose une assurance et que l'expéditeur en fait la demande conformement aux presentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition

Hold & Notify

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg / lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
3	68	K	68	7.57		$514.76	GAD	Soil Samples (non-haz) 66cm x 34cm x 105cm

3 68 68 $514.76

Weight Charge / Prepaid / Porte payé	Taxation au poids / Collect / Port dû
$514.76	
Valuation Charge	Taxation à la valeur
Tax **$33.97**	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier **$164.63**	Total des autres frais dûs au
Total Prepaid / Total port payé **$713.36**	Total collect / Total port dû

Other Charges / Autres frais

5T Fuel Surcharge = 128.69, 5T Nav Can Surcharge = 25.74, ACS Screening Fee = 10.20, GST/HST = 33.97

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

11 Aug 2018 (Date) at à YEV (Place)
Executed on Fait le (Date)

Signature of issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

For Carrier's User only at Destination Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée	Total Collect Charges / Total Du

518-YEV-10355715

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E375383

TRACE ORGANICS REVIEWED BY: Laarni Hafso, Laboratory Manager

DATE REPORTED: Aug 24, 2018

PAGES (INCLUDING COVER): 20

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

SAMPLE DESCRIPTION:				EX18-075	EX18-076	EX18-077	EX18-078	EX18-079	EX18-080	EX18-081	EX18-082
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-15
Parameter	Unit	G / S	RDL	9482966	9482967	9482968	9482969	9482970	9482971	9482972	9482973
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	0.58	1.30	6.57	0.45	0.13	0.48	<0.05	0.86
Ethylbenzene	mg/kg		0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	0.08	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	10	780	<10	<10	<10	180	<10
C16 - C34 (F3)	mg/kg		10	60	170	740	180	80	90	160	100
C34 - C50 (F4)	mg/kg		10	<10	20	150	30	<10	10	<10	10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	33	36	42	29	41	54	6	41
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		105	106	105	106	105	105	106	105
Ethylbenzene-d10 (BTEX)	%	50-150		107	127	133	121	141	142	95	134
o-Terphenyl (F2-F4)	%	50-150		91	88	88	89	89	90	92	90

Certified By:

AGAT Laboratories
6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

SAMPLE DESCRIPTION:				EX18-083	EX18-084	EX18-085	EX18-086	EX18-087	EX18-088	EX18-089	EX18-090
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-15	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9482974	9482975	9482976	9482977	9482978	9482979	9482980	9482981
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.30	<0.05	0.21	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.22	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	40	<10	100	<10	<10	<10	30	<10
C16 - C34 (F3)	mg/kg		10	170	80	170	70	80	120	470	1010
C34 - C50 (F4)	mg/kg		10	30	10	<10	10	20	20	90	90
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	31	32	14	20	7	8	20	4
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		105	106	106	105	104	106	106	105
Ethylbenzene-d10 (BTEX)	%	50-150		125	124	106	124	134	93	120	119
o-Terphenyl (F2-F4)	%	50-150		88	91	91	88	86	86	88	94

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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		EX18-091	EX18-R091	EX18-092	EX18-093	EX18-094	EX18-095	EX18-096	EX18-097
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9482982	9482983	9482984	9482985	9482986	9482987	9482988	9482989
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	2.27	0.38	<0.05	0.15	2.22
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	0.95	<0.05	<0.05	0.07
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	40	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	40	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	20	<10	<10	740	40	<10	<10
C16 - C34 (F3)	mg/kg		10	20	20	<10	200	150	100	160	40
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	40	<10	20	50	10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	8	9	5	31	34	19	26	26
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		105	106	105	107	98	97	98	94
Ethylbenzene-d10 (BTEX)	%	50-150		111	110	113	129	106	82	98	88
o-Terphenyl (F2-F4)	%	50-150		89	92	94	94	93	100	74	89

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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		EX18-098	WR28-001	WR28-002	WR28-003	WR28-004	WR28-005	WR28-006	WR28-007
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9482990	9483027	9483028	9483031	9483032	9483033	9483034	9483035
Benzene	mg/kg		0.005	<0.005	*	*	*	*	*	*	*
Toluene	mg/kg		0.05	1.81	*	*	*	*	*	*	*
Ethylbenzene	mg/kg		0.01	0.04	*	*	*	*	*	*	*
Xylenes	mg/kg		0.05	0.37	*	*	*	*	*	*	*
C6 - C10 (F1)	mg/kg		10	<10	*	*	*	*	*	*	*
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	30	10	110	80	20	<10	80	110
C16 - C34 (F3)	mg/kg		10	250	90	180	120	90	30	150	140
C34 - C50 (F4)	mg/kg		10	80	30	20	20	30	<10	30	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	34	6	17	8	15	6	17	8
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	*	*	*	*	*	*	*
Ethylbenzene-d10 (BTEX)	%	50-150		101	*	*	*	*	*	*	*
o-Terphenyl (F2-F4)	%	50-150		88	119	107	89	81	88	84	78

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FAX (780)462-2490
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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR28-008	WR28-R002	EX18-099	EX18-100	EX18-101	EX18-102
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17	2018-08-17
Parameter	Unit	G / S	RDL	9483036	9483037	9483038	9483039	9483040	9483041
Benzene	mg/kg		0.005	*	*	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	*	*	<0.05	1.61	8.14	<0.05
Ethylbenzene	mg/kg		0.01	*	*	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	*	*	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	*	*	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	90	<10	50	20	20
C16 - C34 (F3)	mg/kg		10	60	140	<10	340	460	100
C34 - C50 (F4)	mg/kg		10	20	20	<10	130	230	41
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	6	11	12	85	44	14
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		*	*	105	105	105	105
Ethylbenzene-d10 (BTEX)	%	50-150		*	*	110	121	140	106
o-Terphenyl (F2-F4)	%	50-150		89	88	94	26	82	84

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9482966-9483041 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR24-001	WR24-002	WR24-003	WR24-004	WR24-005	WR24-006	WR24-007	WR24-008
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9482991	9482993	9482994	9482995	9482996	9482997	9482998	9482999
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	100	270	310	210	190	230	280	290
C16 - C34 (F3)	mg/kg		10	170	340	420	310	280	340	350	290
C34 - C50 (F4)	mg/kg		10	20	30	70	60	50	60	50	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	13	15	16	14	13	14	13	14
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	97	99	98	98	98	98	98
Ethylbenzene-d10 (BTEX)	%	50-150		99	98	102	99	100	96	99	95
o-Terphenyl (F2-F4)	%	50-150		94	94	113	91	90	98	102	121

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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR25-001	WR25-002	WR25-003	WR25-004	WR25-005	WR25-006	WR25-R006	WR25-007
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9483000	9483001	9483004	9483005	9483006	9483007	9483008	9483009
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	120	220	70	140	150	90	120	280
C16 - C34 (F3)	mg/kg		10	170	240	160	250	240	120	190	190
C34 - C50 (F4)	mg/kg		10	60	50	60	70	70	30	90	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	14	14	16	20	19	12	16	16
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	97	98	98	98	97	97	98
Ethylbenzene-d10 (BTEX)	%	50-150		101	99	98	101	104	99	101	98
o-Terphenyl (F2-F4)	%	50-150		105	89	105	90	103	87	89	83

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TEL (780)395-2525
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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR25-008	WR26-001	WR26-002	WR26-003	WR26-004	WR26-005	WR26-006	WR26-007
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9483010	9483011	9483012	9483013	9483014	9483015	9483016	9483017
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	430	150	350	260	290	280	400	300
C16 - C34 (F3)	mg/kg		10	510	330	450	390	350	310	480	450
C34 - C50 (F4)	mg/kg		10	110	80	70	70	50	20	40	80
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	18	17	18	17	16	15	22	16
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	98	98	97	97	98	98	98
Ethylbenzene-d10 (BTEX)	%	50-150		97	94	97	95	103	93	95	94
o-Terphenyl (F2-F4)	%	50-150		77	80	84	82	76	83	93	97

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CANADA T6B 3P9
TEL (780)395-2525
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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR26-008	WR27-001	WR27-002	WR27-003	WR27-004	WR27-005	WR27-006	WR27-007
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16	2018-08-16
Parameter	Unit	G / S	RDL	9483018	9483019	9483020	9483021	9483022	9483023	9483024	9483025
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	0.07	0.09	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	220	350	150	430	550	380	380	100
C16 - C34 (F3)	mg/kg		10	350	440	250	470	590	360	510	250
C34 - C50 (F4)	mg/kg		10	60	50	60	120	90	50	100	80
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	18	14	18	12	20	16	17	15
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		97	98	93	98	98	98	97	98
Ethylbenzene-d10 (BTEX)	%	50-150		94	102	89	94	92	101	132	92
o-Terphenyl (F2-F4)	%	50-150		83	93	82	81	84	80	84	82

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CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-19

DATE REPORTED: 2018-08-24

		SAMPLE DESCRIPTION:		WR27-008
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-08-16
Parameter	Unit	G / S	RDL	9483026
Benzene	mg/kg		0.005	<0.005
Toluene	mg/kg		0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01
Xylenes	mg/kg		0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10
C10 - C16 (F2)	mg/kg		10	220
C16 - C34 (F3)	mg/kg		10	370
C34 - C50 (F4)	mg/kg		10	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A
Moisture Content	%		1	15
Surrogate	Unit	Acceptable Limits		
Toluene-d8 (BTEX)	%	50-150		96
Ethylbenzene-d10 (BTEX)	%	50-150		108
o-Terphenyl (F2-F4)	%	50-150		83

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9482991-9483026 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1649	9482966	< 0.005	< 0.005	NA	< 0.005	97%	80%	120%	86%	80%	120%	94%	60%	140%
Toluene	1649	9482966	0.54	0.58	7.1%	< 0.05	94%	80%	120%	86%	80%	120%	91%	60%	140%
Ethylbenzene	1649	9482966	0.01	0.01	NA	< 0.01	96%	80%	120%	98%	80%	120%	102%	60%	140%
Xylenes	1649	9482966	0.06	0.08	NA	< 0.05	93%	80%	120%	88%	80%	120%	91%	60%	140%
C6 - C10 (F1)	1649	9482966	< 10	< 10	NA	< 10	94%	80%	120%	100%	80%	120%	85%	60%	140%
C10 - C16 (F2)	1237	9482966	<10	<10	NA	< 10	94%	80%	120%	104%	80%	120%	96%	60%	140%
C16 - C34 (F3)	1237	9482966	60	60	0.0%	< 10	103%	80%	120%	90%	80%	120%	88%	60%	140%
C34 - C50 (F4)	1237	9482966	<10	<10	NA	< 10	97%	80%	120%	110%	80%	120%	69%	60%	140%
Moisture Content	1237	9482966	33	33	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1790	9482986	< 0.005	< 0.005	NA	< 0.005	91%	80%	120%	85%	80%	120%	103%	60%	140%
Toluene	1790	9482986	0.38	0.48	23.3%	< 0.05	90%	80%	120%	84%	80%	120%	112%	60%	140%
Ethylbenzene	1790	9482986	0.07	0.08	13.3%	< 0.01	83%	80%	120%	81%	80%	120%	95%	60%	140%
Xylenes	1790	9482986	0.95	1.26	28.1%	< 0.05	89%	80%	120%	80%	80%	120%	95%	60%	140%
C6 - C10 (F1)	1790	9482986	40	40	NA	< 10	99%	80%	120%	118%	80%	120%	85%	60%	140%
C10 - C16 (F2)	1341	9482966	740	720	2.7%	< 10	95%	80%	120%	94%	80%	120%	97%	60%	140%
C16 - C34 (F3)	1341	9482966	150	150	0.0%	< 10	92%	80%	120%	88%	80%	120%	94%	60%	140%
C34 - C50 (F4)	1341	9482966	< 10	< 10	NA	< 10	86%	80%	120%	97%	80%	120%	101%	60%	140%
Moisture Content	1341	9482966	34	37	8.5%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1649	9451020	<0.005	<0.005	NA	< 0.005	97%	80%	120%	89%	80%	120%	120%	60%	140%
Toluene	1649	9451020	<0.05	<0.05	NA	< 0.05	94%	80%	120%	88%	80%	120%	117%	60%	140%
Ethylbenzene	1649	9451020	<0.01	<0.01	NA	< 0.01	96%	80%	120%	102%	80%	120%	139%	60%	140%
Xylenes	1649	9451020	<0.05	<0.05	NA	< 0.05	93%	80%	120%	91%	80%	120%	121%	60%	140%
C6 - C10 (F1)	1649	9451020	<10	<10	NA	< 10	94%	80%	120%	86%	80%	120%	100%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1791	9483010	<0.005	<0.005	NA	< 0.005	90%	80%	120%	112%	80%	120%	79%	60%	140%
Toluene	1791	9483010	<0.05	<0.05	NA	< 0.05	88%	80%	120%	112%	80%	120%	76%	60%	140%
Ethylbenzene	1791	9483010	<0.01	<0.01	NA	< 0.01	84%	80%	120%	107%	80%	120%	77%	60%	140%
Xylenes	1791	9483010	<0.05	<0.05	NA	< 0.05	88%	80%	120%	105%	80%	120%	72%	60%	140%
C6 - C10 (F1)	1791	9483010	<10	<10	NA	< 10	98%	80%	120%	88%	80%	120%	84%	60%	140%
C10 - C16 (F2)	1343	9483010	430	430	0.0%	< 10	95%	80%	120%	90%	80%	120%	78%	60%	140%
C16 - C34 (F3)	1343	9483010	510	500	2.0%	< 10	96%	80%	120%	84%	80%	120%	71%	60%	140%
C34 - C50 (F4)	1343	9483010	110	80	31.6%	< 10	95%	80%	120%	100%	80%	120%	88%	60%	140%
Moisture Content	1343	9483010	18	18	0.0%	< 1									

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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
C10 - C16 (F2)	1343	9490735	< 10	< 10	NA	< 10	94%	80%	120%	107%	80%	120%	103%	60%	140%
C16 - C34 (F3)	1343	9490735	40	60	NA	< 10	94%	80%	120%	104%	80%	120%	101%	60%	140%
C34 - C50 (F4)	1343	9490735	30	40	NA	< 10	88%	80%	120%	109%	80%	120%	106%	60%	140%
Moisture Content	1343	9490735	15	13	14.3%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E375383

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

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Calgary, Alberta T2E 7P7
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Laboratory Use Only
Arrival Temperature: 3.7°C
AGAT Job Number: /8E375383
Date and Time: '18 AUG 19 11:39

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500 - 2618 Hopewell Place NE
Calgary AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By:

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☒ No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: IO2018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☒ Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	CCME/AB : BTEX/F1-F4	CCME/AB : BTEX /F1-F2	BC: BTEX/VPH/EPH	BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9482966	EX18-075	0.6	Aug 15/18	soil		3				X											
2	967	EX18-076	↓	↓	↓		3				X											
3	968	EX18-077					3				X											
4	969	EX18-078					3				X											
5	976	EX18-079					3				X											
6	971	EX18-080					3				X											
7	972	EX18-081					3				X											
8	973	EX18-082					3				X											
9	974	EX18-083					3				X											
10	975	EX18-084	↓	↓	↓		3				X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	Aug 17/18 6:00 pm		81191 2018
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

N°: AB 090073

AGAT Laboratories

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Chain of Custody Record

P: 403.735.2005 • F: 403.735.2771

Report to:

Company: IEG Consultants Same as COC#: 090073

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐							HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9482976	EX18-085	Soil	Aug 15/18		3		X																	
977	EX18-086				3		X																	
978	EX18-087				3		X																	
979	EX18-088		Aug 16/18		3		X																	
980	EX18-089				3		X																	
981	EX18-090				3		X																	
982	EX18-091				3		X																	
983	EX18-R091				3		X																	
984	EX18-092				3		X																	
985	EX18-093				3		X																	
986	EX18-094				3		X																	
987	EX18-095				3		X																	
988	EX18-096				3		X																	
989	EX18-097				3		X																	
990	EX18-098				3		X																	
991	WR24-001				2		X																	
993	WR24-002				2		X																	
994	WR24-003				2		X																	
995	WR24-004				2		X																	
996	WR24-005				2		X																	
997	WR24-006				2		X																	
998	WR24-007				2		X																	
999	WR24-008				2		X																	
3000	WR25-001				2		X																	
001	WR25-002				2		X																	

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time		
Stephanie Hannem (signature)	Aug 17/18 6:00pm	(signature)	8/19/2018	Pink Copy - Client	Page 2 of 4
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time	Yellow Copy - AGAT	
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time	White Copy- AGAT	Nº: AB 039584 A

Document ID: DIV-50-1507.002

Date Revised: December 8th, 2013

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Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090073

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9483004	WR25-003	Soil	Aug 16/18		2		X											
005	WR25-004				2		X											
006	WR25-005				2		X											
007	WR25-006				2		X											
008	WR25-R006				2		X											
009	WR25-007				2		X											
010	WR25-008				2		X											
011	WR26-001				2		X											
012	WR26-002				2		X											
013	WR26-003				2		X											
014	WR26-004				2		X											
015	WR26-005				2		X											
016	WR26-006				2		X											
017	WR26-007				2		X											
018	WR26-008				2		X											
019	WR27-001				2		X											
020	WR27-002				2		X											
021	WR27-003				2		X											
022	WR27-004				2		X											
023	WR27-005				2		X											
024	WR27-006				2		X											
025	WR27-007				2		X											
026	WR27-008				2		X											
027	WR28-001	Soil	Aug 17/18		2		X											
028	WR28-002	Soil	Aug 17/18		2		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	Aug 17/18 6:00pm		8/19/2018
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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Page 3 of 4

N°: AB 039583 A

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Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090073

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9483031	WR28-003	Soil	Aug 17/18		2		X											
032	WR28-004				2		X											
033	WR28-005				2		X											
034	WR28-006				2		X											
035	WR28-007				2		X											
036	WR28-008				2		X											
037	WR28-R008 2				2		X											
038	EX18-099				3		X											
039	EX18-100				3		X											
040	EX18-101				3		X											
041	EX18-102				3		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	Aug 17/18 6:00pm		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

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White Copy- AGAT

Page 4 of 4

N°: AB 039582 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: IEG Consultants

Courier: Canadian North Prepaid Collect

Waybill# 518-YEK-10362862

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen) 3.7°C

1 (~~Bottle~~/Jar) 2.3 + 3.3 + 3.3 = 2.9 °C

2 (Bottle/~~Jar~~) 4.5 + 4.5 + 4.5 = 4.5 °C

3 (Bottle/Jar)___+___+___=____ °C

4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C

6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C

8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C

10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E375383

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-10360862

Shipper's Name and Address
Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont origineaux et ont la meme validité.

Consignee's Name and Address
Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables

KLO100CW

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé

Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	CANADIAN NORTH				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val		Other/Autres		Declared Value for Carriage Valeur déclarée pour la transport	Declared value for Customs Valeur déclarée pour la douane
		PPD Payé	COLL Du	PPD Payé	COLL Du		
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lassurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition

HFPU
KEEP COOL

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg / lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
2	58	K	58	7.57		$439.06	GAD	Soil Samples 60cm x 33cm x 70cm

2 **58** **58** **$439.06**

Weight Charge **Prepaid / Porte payé**	Taxation au poids **Collect / Port dû**
$439.06	
Valuation Charge	Taxation à la valeur
Tax **$28.97**	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier **$140.42**	Total des autres frais dûs au
Total Prepaid / Total port payé **$608.45**	Total collect / Total port dû

Other Charges / Autres frais

5T Fuel Surcharge = 109.77, 5T Nav Can Surcharge = 21.95, ACS Screening Fee = 8.70, GST/HST = 28.97

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

18 Aug 2018 (Executed on / Fait le (Date)) YEV (at / á (Place) / (Lieu))

Signature of issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

For Carrier's User only at Destination Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée	Total Collect Charges / Total Du

518-YEV-10360862

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E378347

TRACE ORGANICS REVIEWED BY: Melinda Guay, Technical Reviewer

DATE REPORTED: Aug 30, 2018

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-27

DATE REPORTED: 2018-08-29

		SAMPLE DESCRIPTION:		EX18-103	EX18-104	EX18-105	EX18-106	EX18-R106	EX18-107	EX18-108	EX18-109
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-19	2018-08-19	2018-08-20	2018-08-20	2018-08-20	2018-08-20	2018-08-20	2018-08-20
Parameter	Unit	G / S	RDL	9501942	9501945	9501946	9501947	9501948	9501949	9501950	9501951
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.044
Toluene	mg/kg		0.05	0.56	<0.05	4.74	4.36	4.45	0.83	5.68	5.97
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.38	<0.01
Xylenes	mg/kg		0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.20	2.48	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	10	20	50	60	40	10	30
C16 - C34 (F3)	mg/kg		10	140	40	150	220	260	410	470	1230
C34 - C50 (F4)	mg/kg		10	40	20	70	70	90	180	210	580
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	19	10	20	35	33	34	30	37
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		107	101	101	102	102	101	102	102
Ethylbenzene-d10 (BTEX)	%	50-150		126	149	81	101	120	98	92	100
o-Terphenyl (F2-F4)	%	50-150		89	110	92	96	92	93	102	90

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-27

DATE REPORTED: 2018-08-29

		SAMPLE DESCRIPTION:		EX18-110	EX18-111	EX18-112	EX18-113	EX18-114	EX18-115	EX18-116	EX18-117
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-20	2018-08-21	2018-08-21	2018-08-21	2018-08-21	2018-08-21	2018-08-21	2018-08-22
Parameter	Unit	G / S	RDL	9501952	9501953	9501956	9501957	9501958	9501959	9501960	9501961
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	0.536	0.049	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	3.81	1.06	9.67	12.3	1.29	0.38	0.96
Ethylbenzene	mg/kg		0.01	<0.01	0.17	0.24	0.15	4.87	<0.01	0.05	<0.01
Xylenes	mg/kg		0.05	<0.05	1.00	0.91	0.86	27.8	0.13	0.35	<0.05
C6 - C10 (F1)	mg/kg		10	<10	40	<10	20	60	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	40	<10	10	10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	120	320	390	110	30	150	100	20
C16 - C34 (F3)	mg/kg		10	370	250	250	490	690	290	190	170
C34 - C50 (F4)	mg/kg		10	110	100	70	210	350	100	40	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	20	34	35	38	28	54	36	49
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		101	102	101	103	102	101	101	101
Ethylbenzene-d10 (BTEX)	%	50-150		86	125	100	107	132	139	114	109
o-Terphenyl (F2-F4)	%	50-150		101	82	83	90	98	124	91	91

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-27

DATE REPORTED: 2018-08-29

		SAMPLE DESCRIPTION:		EX18-118	EX18-119	EX18-120	EX18-121	EX18-122	EX18-123	EX18-R123	GS18-001
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-23	2018-08-23	2018-08-23	2018-08-23	2018-08-23	2018-08-23	2018-08-23	2018-08-24
Parameter	Unit	G / S	RDL	9501964	9501984	9501985	9501986	9501987	9501988	9501989	9502008
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	5.29	0.12	0.38	0.32	0.07	0.56	0.64	0.08
Ethylbenzene	mg/kg		0.01	<0.01	0.01	<0.01	0.04	<0.01	<0.01	<0.01	0.02
Xylenes	mg/kg		0.05	<0.05	0.08	<0.05	0.25	<0.05	0.06	0.11	0.07
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	20	100	250	20	10	30	50	60
C16 - C34 (F3)	mg/kg		10	240	180	200	250	160	150	260	210
C34 - C50 (F4)	mg/kg		10	120	50	50	120	60	70	100	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	40	12	20	19	29	24	25	17
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		102	101	101	101	108	107	108	108
Ethylbenzene-d10 (BTEX)	%	50-150		99	138	80	88	108	126	84	142
o-Terphenyl (F2-F4)	%	50-150		99	83	87	99	118	84	136	95

Certified By:

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-27

DATE REPORTED: 2018-08-29

		SAMPLE DESCRIPTION:		GS18-002	GS18-003	GS18-004	GS18-005
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-24	2018-08-24	2018-08-24	2018-08-24
Parameter	Unit	G / S	RDL	9502009	9502010	9502011	9502012
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	180	120	120	40
C16 - C34 (F3)	mg/kg		10	300	290	210	120
C34 - C50 (F4)	mg/kg		10	50	60	40	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A
Moisture Content	%		1	12	13	13	7
Surrogate	Unit	Acceptable Limits					
Toluene-d8 (BTEX)	%	50-150		108	108	109	107
Ethylbenzene-d10 (BTEX)	%	50-150		105	102	97	101
o-Terphenyl (F2-F4)	%	50-150		86	82	88	96

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9501942-9502012 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-08-27

DATE REPORTED: 2018-08-29

		SAMPLE DESCRIPTION:		WR29-001	WR29-002	WR29-003	WR29-004	WR29-005	WR29-006
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-24	2018-08-24	2018-08-24	2018-08-24	2018-08-24	2018-08-24
Parameter	Unit	G / S	RDL	9501990	9501993	9501994	9501995	9501996	9501997
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	10	20	20	<10	70	10
C16 - C34 (F3)	mg/kg		10	70	50	50	40	70	50
C34 - C50 (F4)	mg/kg		10	20	10	20	10	20	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	9	7	7	7	8	7
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		108	108	108	108	107	108
Ethylbenzene-d10 (BTEX)	%	50-150		116	119	115	112	117	118
o-Terphenyl (F2-F4)	%	50-150		89	86	98	89	96	87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9501990-9501997 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1798	9501942	<0.005	<0.005	NA	< 0.005	96%	80%	120%	84%	80%	120%	130%	60%	140%
Toluene	1798	9501942	0.31	0.33	6.3%	< 0.05	97%	80%	120%	85%	80%	120%	131%	60%	140%
Ethylbenzene	1798	9501942	0.03	0.03	NA	< 0.01	97%	80%	120%	89%	80%	120%	139%	60%	140%
Xylenes	1798	9501942	0.17	0.18	NA	< 0.05	97%	80%	120%	82%	80%	120%	131%	60%	140%
C6 - C10 (F1)	1798	9501942	<10	<10	NA	< 10	103%	80%	120%	82%	80%	120%	127%	60%	140%
C10 - C16 (F2)	1243	9501942	20	20	NA	< 10	92%	80%	120%	103%	80%	120%	100%	60%	140%
C16 - C34 (F3)	1243	9501942	140	170	19.4%	< 10	87%	80%	120%	93%	80%	120%	90%	60%	140%
C34 - C50 (F4)	1243	9501942	40	60	NA	< 10	98%	80%	120%	100%	80%	120%	97%	60%	140%
Moisture Content	1243	9501942	19	21	10.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1658	9501989	<0.005	<0.005	NA	< 0.005	98%	80%	120%	94%	80%	120%	85%	60%	140%
Toluene	1658	9501989	0.64	0.68	6.1%	< 0.05	96%	80%	120%	91%	80%	120%	82%	60%	140%
Ethylbenzene	1658	9501989	<0.01	0.01	NA	< 0.01	98%	80%	120%	108%	80%	120%	96%	60%	140%
Xylenes	1658	9501989	0.11	0.12	NA	< 0.05	94%	80%	120%	95%	80%	120%	89%	60%	140%
C6 - C10 (F1)	1658	9501989	<10	<10	NA	< 10	103%	80%	120%	93%	80%	120%	94%	60%	140%
C10 - C16 (F2)	784	9501989	50	20	NA	< 10	97%	80%	120%	119%	80%	120%	113%	60%	140%
C16 - C34 (F3)	784	9501989	260	330	23.7%	< 10	100%	80%	120%	120%	80%	120%	114%	60%	140%
C34 - C50 (F4)	784	9501989	100	140	33.3%	< 10	96%	80%	120%	111%	80%	120%	105%	60%	140%
Moisture Content	784	9501989	25	30	18.2%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E378347

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/MS
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E378347
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills NE
Address: 500-2618 Hopewell Place
Calgary AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By:

Invoice To Same Yes ☑ No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: I02018-002

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ Agricultural ☐ Industrial ☐ Residential/Park ☐ Commercial ☐ FWAL
☐ AB Tier 1 ☐ Agricultural ☐ Industrial ☐ Residential/Park ☐ Commercial ☐ Natural Area
☐ Drinking Water
☐ Alberta Surface Water ☐ Chronic ☐ Acute
☐ Other:

Report Format
Single
☐ Sample Per Page
☒ Multiple Samples Per Page
☐ Export

18 AUG 27 11:47

LABORATORY USE (LAB ID #)		SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50 ☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX /F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9501 942	EX18-103	0.6	Aug 19/18	Soil		3			X										
2	945	EX18-104		Aug 19/18			3			X										
3	946	EX18-105		Aug 20/18			3			X										
4	947	EX18-106					3			X										
5	948	EX18-R106					3			X										
6	949	EX18-107					3			X										
7	950	EX18-108					3			X										
8	951	EX18-109					3			X										
9	952	EX18-110					3			X										
10	953	EX18-111		Aug 21/18			3			X										

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem			27AUG18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 2

N°: AB 090057

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090057

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT
9501 956	EX18-112	Soil	Aug 21/18	
957	EX18-113			
958	EX18-114			
959	EX18-115			
960	EX18-116			
961	EX18-117		Aug 22/18	
964	EX18-118		Aug 23/18	
984	EX18-119			
985	EX18-120			
986	EX18-121			
987	EX18-122			
988	EX18-123			
989	EX18-R123			
990	WR29-001		Aug 24/18	
993	WR29-002			
994	WR29-003			
995	WR29-004			
996	WR29-005			
997	WR29-006			
9502 008	GS18-001			
009	GS18-002			
010	GS18-003			
011	GS18-004			
012	GS18-005			

# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
3		X											
3		X											
3		X											
3		X											
3		X											
3		X											
3		X											
3		X											
3		X											
3		X											
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3		X											
2		X											
2		X											
2		X											
2		X											
2		X											
3		X											
3		X											
3		X											
3		X											
3		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem			27 AUG 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 2

Nº: AB 039581 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: IEG

Courier: CN Prepaid Collect

Waybill# 518-YEV-10366306

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: n/a

Hydrocarbons: Earliest Expiry TERRA CORES

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 0.9 + 0.9 + 0.9 = 0.9 °C 2(Bottle/Jar)___+___+___=____°C

3 (Bottle/Jar)___+___+___=____°C 4 (Bottle/Jar)___+___+___=____°C

5 (Bottle/Jar)___+___+___=____°C 6 (Bottle/Jar)___+___+___=____°C

7 (Bottle/Jar)___+___+___=____°C 8 (Bottle/Jar)___+___+___=____°C

9 (Bottle/Jar)___+___+___=____°C 10 (Bottle/Jar)___+___+___=____°C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E378347

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other:_____

Account Project Manager:_____have they been notified of the above issues: Yes No

Whom spoken to:_____ Date/Time:_____

CPM Initial_____

General Comments:_____

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-10366506

Shipper's Name and Address
Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont originaux et ont la meme validité.

Consignee's Name and Address
Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILTY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables **KLO100CW**

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE.
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé
Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par	Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur déclarée pour la transport	Declared value for Customs Valeur déclarée pour la douane
YEG	CANADIAN NORTH					CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lássurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expédieur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition
HFPU

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
1	23	K	23	7.57		$174.11	GAD	Soil Samples (non-haz) 60cm x 33cm x 35cm

1	**23**	**23**

$174.11

Weight Charge
Prepaid / Porte payé
$174.11

Taxation au poids
Collect / Port dû

Other Charges / Autres frais

5T Fuel Surcharge = 43.53, 5T Nav Can Surcharge = 8.71, ACS Screening Fee = 7.50, GST/HST = 11.69

Valuation Charge

Taxation à la valeur

Tax
$11.69

Taxe

Total other Charges Due Agent

Total des autres frais dûs à l'agent

Total other Charges Due Carrier
$59.74

Total des autres frais dûs au

Total Prepaid / Total port payé
$245.54

Total collect / Total port dû

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

25 Aug 2018 (Date) at (Place) YEV
Executed on (Date) at (Lieu)
Fait le

Signature of issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

For Carrier's User only at Destination
Réservé au transporteur à destination

Charges at Destination / Frais à l'arrivée

Total Collect Charges / Total Du

518-YEV-10366506

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E379684

TRACE ORGANICS REVIEWED BY: Jarrod Roberts, Operations Manager

DATE REPORTED: Sep 05, 2018

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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TEL (780)395-2525
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Certificate of Analysis

AGAT WORK ORDER: 18E379684

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-30

DATE REPORTED: 2018-09-05

		SAMPLE DESCRIPTION:		EX18-124	EX18-125	EX18-126	EX18-127	EX18-128	EX18-129	EX18-130	EX18-131
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-26	2018-08-26	2018-08-26	2018-08-26	2018-08-26	2018-08-26	2018-08-26	2018-08-27
Parameter	Unit	G / S	RDL	9510137	9510146	9510147	9510148	9510149	9510150	9510151	9510152
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	0.095	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	0.17	<0.05	0.48	0.18	0.14	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	0.16	0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	0.61	0.09	0.07	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	10	50	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	10	50	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	980	340	30	330	1010	<10
C16 - C34 (F3)	mg/kg		10	30	20	1180	380	160	330	800	60
C34 - C50 (F4)	mg/kg		10	20	<10	30	30	60	30	40	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	8	5	8	9	27	15	10	8
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		100	101	100	100	101	101	100	100
Ethylbenzene-d10 (BTEX)	%	50-150		76	84	74	74	96	87	77	84
o-Terphenyl (F2-F4)	%	50-150		74	74	73	80	78	70	73	70

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E379684

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-30

DATE REPORTED: 2018-09-05

		SAMPLE DESCRIPTION:		EX18-132	EX18-133	EX18-134	EX18-135	WR21-009	WR21-010	WR21-011	WR21-013
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-27	2018-08-27	2018-08-27	2018-08-27	2018-08-27	2018-08-27	2018-08-27	2018-08-27
Parameter	Unit	G / S	RDL	9510153	9510154	9510158	9510160	9510164	9510170	9510171	9510173
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	30	90	<10	100	150	100	180
C16 - C34 (F3)	mg/kg		10	20	60	230	110	200	260	200	260
C34 - C50 (F4)	mg/kg		10	10	30	70	30	40	50	40	40
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	7	5	18	7	12	15	14	12
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		99	99	100	100	100	100	101	101
Ethylbenzene-d10 (BTEX)	%	50-150		81	83	88	86	76	89	98	86
o-Terphenyl (F2-F4)	%	50-150		78	75	75	70	71	73	69	71

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E379684

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-08-30

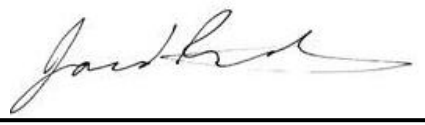
DATE REPORTED: 2018-09-05

SAMPLE DESCRIPTION:				WR21-014	WR21-015	WR21-016
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2018-08-27	2018-08-27	2018-08-27
Parameter	Unit	G / S	RDL	9510174	9510175	9510176
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	0.17	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	110	130	280
C16 - C34 (F3)	mg/kg		10	220	240	390
C34 - C50 (F4)	mg/kg		10	50	50	60
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A
Moisture Content	%		1	12	13	23
Surrogate	Unit	Acceptable Limits				
Toluene-d8 (BTEX)	%	50-150		100	101	100
Ethylbenzene-d10 (BTEX)	%	50-150		81	80	88
o-Terphenyl (F2-F4)	%	50-150		67	68	66

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9510137-9510176 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:



AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E379684

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1801	9510149	0.095	0.120	23.3%	< 0.005	95%	80%	120%	90%	80%	120%	94%	60%	140%
Toluene	1801	9510149	0.48	0.61	23.9%	< 0.05	97%	80%	120%	90%	80%	120%	95%	60%	140%
Ethylbenzene	1801	9510149	0.16	0.20	22.2%	< 0.01	97%	80%	120%	90%	80%	120%	96%	60%	140%
Xylenes	1801	9510149	0.61	0.75	20.6%	< 0.05	98%	80%	120%	84%	80%	120%	89%	60%	140%
C6 - C10 (F1)	1801	9510149	<10	<10	NA	< 10	97%	80%	120%	89%	80%	120%	76%	60%	140%
C10 - C16 (F2)	788	9510149	30	30	NA	< 10	95%	80%	120%	90%	80%	120%	80%	60%	140%
C16 - C34 (F3)	788	9510149	160	130	20.7%	< 10	99%	80%	120%	91%	80%	120%	82%	60%	140%
C34 - C50 (F4)	788	9510149	60	50	18.2%	< 10	92%	80%	120%	82%	80%	120%	75%	60%	140%
Moisture Content	788	9510149	27	25	7.7%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E379684

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E379684
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: Nicole Wills
Address: 500 - 2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: AD4012A10
Sampled By:

Report Information
1. Name: Kim MacKenzie
Email: kmackenzie@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Stephanie Hannem
Email: shannem@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☐ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: IO2018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☒ Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX /F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1 9510137	EX18-124	0.6	AUG 26/18	SOIL		3				X									
2 146	EX18-125					3				X									
3 147	EX18-126					3				X									
4 148	EX18-127					3				X									
5 149	EX18-128					3				X									
6 150	EX18-129					3				X									
7 151	EX18-130					3				X									
8 152	EX18-131		AUG 27/18			3				X									
9 153	EX18-132					3				X									
10 154	EX18-133					3				X									

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie	AUG 27/18 16:45		30 AUG 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 2

N°: AB 090058

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants

Same as COC#: 090058

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
158	EX18-134	Soil	AUG 27/18		3		X											
160	EX18-135	↓	↓		3		X											
164	WR21-009				2		X											
170	WR21-010				2		X											
171	WR21-011				2		X											
172	WR21-012				2		X											
173	WR21-013				2		X											
174	WR21-014				2		X											
176	WR21-015				2		X											
176	WR21-016	↓	↓		2		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	AUG 27/18 16:45		30AUG18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 2

N°: AB 039580 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: IEG

Courier: CANADIAN NORTH (Prepaid) Collect

Waybill# 518-YEV-10368164

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: N/S

Hydrocarbons: Earliest Expiry TETRACORDS

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 4.9+3.1+4.7+4.9 °C 2(Bottle/Jar)___+___+___=____ °C

3 (Bottle/Jar)___+___+___=____ °C 4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C 6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C 8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C 10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E379684

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: Sample 172: Not Assigned BTEX/PHC as per CPM.

Sample 164-176: No methanol vials rec'd.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH

518-YEV-10368164

Air Waybill / Lettre de transport aérien

IEG - Camp Farewell
PO Box 1338
Inuvik
Northwest Territories, Canada
403.829-3098
Attn: Nicole Wills

ADAT Laboratories Ltd
4310 Roper Road
Edmonton
Alberta, Canada
780 935 2525
Attn: Scot

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

KLO106CW

Inuvik

To / A	By first carrier / Par premier transport	To / A	By / Par	To / A	By / Par
YEG	CANADIAN NORTH				

Currency	CHGS Code	WT/VAL PPD	WT/VAL COLL	Other PPD	Other COLL	Declared value for Carriage	Declared value for Customs
CDN	PX	X		X		NDV	NCV

Edmonton

Handling Information / Renseignements pour le traitement de l'expédition
NFPU
KEEP COOL

SCI

No. of Pieces RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Taxation	Total	Commodity Item No. No. d'article de marchandise	Description of Goods (incl. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
1	18 K		18	7.57	$136.26	GAD	Soil Samples
1	18		18		$136.26		

Weight Charge Prepaid / Poids payé $136.26	Taxation au poste Collect / Port dû
Valuation Charge	Taxation à la valeur
Tax $9.23	Taxe
Total Other Charges Due Agent	Total des autres frais dûs à l'agent
Total Other Charges Due Carrier $48.38	Total des autres frais dûs au
Total Prepaid / Total port payé $193.87	Total collect / Total port dû
For Carrier's Use only at Destination Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée

Other Charges / Autres frais
5T Fuel Surcharge = 34.07, 5T Nav Can Surcharge = 6.81, ACS Screening Fee = 7.56, GST/HST = 9.23

Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les mentions portées sur le présent document sont exactes et que dans la mesure où une partie de l'expédition contient des marchandises dangereuses, cette partie de l'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

Executed on / Fait le	Date	at / à	Place / Endroit
28 Aug 2018			YEV

Signature of Issuing Carrier or its Agent / Signature du Transporteur émetteur ou de son Agent

Total Collect Charges / Total dû

518-YEV-10368164

Track online at CanadianNorth.com/CargoTrack

Copy 2 shipper / consignee

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012 A10

AGAT WORK ORDER: 18E381561

TRACE ORGANICS REVIEWED BY: Melinda Guay, Technical Reviewer

DATE REPORTED: Sep 10, 2018

PAGES (INCLUDING COVER): 14

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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EDMONTON, ALBERTA
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TEL (780)395-2525
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		EX18-136	EX18-137	EX18-138	EX18-139	EX18-140	EX18-141	EX18-142	EX18-143
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-29	2018-08-29	2018-08-29	2018-08-29	2018-08-30	2018-08-30	2018-08-30	2018-08-30
Parameter	Unit	G / S	RDL	9523317	9523322	9523323	9523324	9523325	9523326	9523327	9523328
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	40	<10	120	10	20	<10	30	<10
C16 - C34 (F3)	mg/kg		10	50	10	1140	110	30	20	60	80
C34 - C50 (F4)	mg/kg		10	20	<10	40	30	20	10	30	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	8	11	10	12	35	21	16	18
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		107	108	107	107	107	108	107	108
Ethylbenzene-d10 (BTEX)	%	50-150		95	97	92	108	122	102	118	104
o-Terphenyl (F2-F4)	%	50-150		85	84	80	84	87	83	86	86

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		EX18-R139	EX18-144	EX18-145	EX18-146	EX18-147	EX18-148	EX18-149
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-29	2018-09-02	2018-09-02	2018-09-02	2018-09-02	2018-09-02	2018-09-02
Parameter	Unit	G / S	RDL	9523329	9523383	9523387	9523389	9523390	9523391	9523392
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	0.19	0.14	0.10	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	40	400	<10	190
C16 - C34 (F3)	mg/kg		10	70	360	<10	260	140	70	260
C34 - C50 (F4)	mg/kg		10	30	150	10	70	40	40	50
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	10	42	9	25	25	26	17
Surrogate	Unit	Acceptable Limits								
Toluene-d8 (BTEX)	%	50-150		106	100	100	100	99	99	99
Ethylbenzene-d10 (BTEX)	%	50-150		115	122	84	102	94	121	98
o-Terphenyl (F2-F4)	%	50-150		86	79	76	77	75	78	77

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9523317-9523392 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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EDMONTON, ALBERTA
CANADA T6B 3P9
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FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		WR30-001	WR30-002	WR30-003	WR30-004	WR30-005	WR30-006	WR30-007	WR30-R006
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-29	2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-08-31
Parameter	Unit	G / S	RDL	9523335	9523336	9523345	9523346	9523347	9523348	9523349	9523350
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	10	10	30	20	30	50	20	210
C16 - C34 (F3)	mg/kg		10	60	40	70	50	80	50	60	90
C34 - C50 (F4)	mg/kg		10	10	10	20	10	20	10	20	30
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	10	9	9	12	8	10	10	10
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		108	107	108	107	106	107	106	106
Ethylbenzene-d10 (BTEX)	%	50-150		90	102	96	93	98	100	104	98
o-Terphenyl (F2-F4)	%	50-150		86	85	83	81	83	82	88	82

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		WR27W-001	WR27W-002	WR27W-003	WR27W-004	WR27W-005	WR27W-006	WR27E-001	WR27E-002
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-08-31	2018-09-03	2018-09-03
Parameter	Unit	G / S	RDL	9523351	9523352	9523353	9523354	9523355	9523356	9523398	9523401
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	190	110	130	140	150	120	160	130
C16 - C34 (F3)	mg/kg		10	340	190	200	170	210	150	360	220
C34 - C50 (F4)	mg/kg		10	90	40	40	40	40	30	110	60
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	16	14	16	20	17	18	18	16
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		107	107	108	100	100	100	100	100
Ethylbenzene-d10 (BTEX)	%	50-150		113	90	92	101	68	97	102	92
o-Terphenyl (F2-F4)	%	50-150		87	79	76	74	84	81	82	79

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		WR27E-003	WR27E-004	WR27E-005	WR27E-006	WR23W-001	WR23W-002	WR23W-003	WR23W-004
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-09-03	2018-09-03	2018-09-03	2018-09-03	2018-09-03	2018-09-03	2018-09-03	2018-09-03
Parameter	Unit	G / S	RDL	9523402	9523403	9523404	9523405	9523406	9523407	9523408	9523409
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	120	100	190	160	200	260	220	220
C16 - C34 (F3)	mg/kg		10	150	200	330	290	360	430	360	400
C34 - C50 (F4)	mg/kg		10	50	60	80	70	90	90	70	100
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	15	18	17	15	17	16	14	14
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		100	100	100	100	100	99	100	100
Ethylbenzene-d10 (BTEX)	%	50-150		108	92	98	99	88	99	106	99
o-Terphenyl (F2-F4)	%	50-150		73	82	79	87	81	69	78	80

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Certificate of Analysis

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-05

DATE REPORTED: 2018-09-10

		SAMPLE DESCRIPTION:		WR23W-005
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-09-03
Parameter	Unit	G / S	RDL	9523410
Benzene	mg/kg		0.005	<0.005
Toluene	mg/kg		0.05	0.74
Ethylbenzene	mg/kg		0.01	0.02
Xylenes	mg/kg		0.05	0.07
C6 - C10 (F1)	mg/kg		10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10
C10 - C16 (F2)	mg/kg		10	180
C16 - C34 (F3)	mg/kg		10	280
C34 - C50 (F4)	mg/kg		10	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A
Moisture Content	%		1	15
Surrogate	Unit	Acceptable Limits		
Toluene-d8 (BTEX)	%	50-150		100
Ethylbenzene-d10 (BTEX)	%	50-150		105
o-Terphenyl (F2-F4)	%	50-150		63

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9523335-9523410 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 10, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1665	9523317	<0.005	<0.005	NA	< 0.005	87%	80%	120%	82%	80%	120%	113%	60%	140%
Toluene	1665	9523317	<0.05	<0.05	NA	< 0.05	87%	80%	120%	81%	80%	120%	109%	60%	140%
Ethylbenzene	1665	9523317	<0.01	<0.01	NA	< 0.01	89%	80%	120%	82%	80%	120%	128%	60%	140%
Xylenes	1665	9523317	<0.05	<0.05	NA	< 0.05	86%	80%	120%	81%	80%	120%	114%	60%	140%
C6 - C10 (F1)	1665	9523317	<10	<10	NA	< 10	95%	80%	120%	84%	80%	120%	100%	60%	140%
C10 - C16 (F2)	1248	9523317	40	<10	NA	< 10	97%	80%	120%	94%	80%	120%	93%	60%	140%
C16 - C34 (F3)	1248	9523317	50	20	NA	< 10	103%	80%	120%	85%	80%	120%	87%	60%	140%
C34 - C50 (F4)	1248	9523317	20	<10	NA	< 10	105%	80%	120%	97%	80%	120%	94%	60%	140%
Moisture Content	1248	9523317	8	6	28.6%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1807	9523389	<0.005	<0.005	NA	< 0.005	83%	80%	120%	96%	80%	120%	69%	60%	140%
Toluene	1807	9523389	0.19	0.20	NA	< 0.05	90%	80%	120%	102%	80%	120%	71%	60%	140%
Ethylbenzene	1807	9523389	<0.01	<0.01	NA	< 0.01	92%	80%	120%	109%	80%	120%	76%	60%	140%
Xylenes	1807	9523389	<0.05	<0.05	NA	< 0.05	94%	80%	120%	106%	80%	120%	73%	60%	140%
C6 - C10 (F1)	1807	9523389	<10	<10	NA	< 10	92%	80%	120%	81%	80%	120%	78%	60%	140%
C10 - C16 (F2)	792	9523389	40	30	NA	< 10	108%	80%	120%	89%	80%	120%	92%	60%	140%
C16 - C34 (F3)	792	9523389	260	230	12.2%	< 10	113%	80%	120%	90%	80%	120%	94%	60%	140%
C34 - C50 (F4)	792	9523389	70	80	13.3%	< 10	107%	80%	120%	84%	80%	120%	82%	60%	140%
Moisture Content	792	9523389	25	27	7.7%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
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Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E381561

PROJECT: A04012 A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E38156
Date and Time: '18 SEP 05 10:09

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG Consultants
Contact: ~~Sue~~ Nicole Wills
Address: 500 - 2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-136-6809 Fax:
LSD:
Client Project #: AD4012A10
Sampled By:

Report Information
1. Name: Nicole Wills
Email: nwills@klohn.com
2. Name: Stphanie Hannem
Email: shannem@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☐ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: IO2018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
☒ Multiple Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr6+	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	95J3317 EX18-136	0.6	AUG 29/18	SOIL		3				X										
2	322 EX18-137	↓	↓	↓		3				X										
3	323 EX18-138					3				X										
4	324 EX18-139		↓			3				X										
5	325 EX18-1340		AUG 3/18			3				X										
6	326 EX18-141		↓			3				X										
7	327 EX18-142					3				X										
8	328 EX18-143		↓			3				X										
9	329 EX18-R139	↓	AUG 29/18			3				X										
10	335 WR30-001	—		↓		2				X										

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Kim MacKenzie	Sep 3/18 12:30		05Sep18

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page 1 of 3

N°: AB 090059

Document ID: DIV-50-1507.005.

Date Revised: May 10, 2018

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090059

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
336	WR30-002	Soil	AUG 31/18		2		X											
345	WR30-003				2		X											
346	WR30-004				2		X											
347	WR30-005				2		X											
348	WR30-006				2		X											
349	WR30-007				2		X											
350	WR30-R006				2		X											
351	WR27W-001				2		X											
352	WR27W-002				2		X											
353	WR27W-003				2		X											
354	WR27W-004				2		X											
355	WR27W-005				2		X											
356	WR27W-006				2		X											
383	EX18-144		SEP 2/18		3		X											
387	EX18-145				3		X											
389	EX18-146				3		X											
390	EX18-147				3		X											
391	EX18-148				3		X											
392	EX18-149.				3		X											
398	WR27E-001		SEP 3/18		2		X											
401	WR27E-002				2		X											
402	WR27E-003				2		X											
403	WR27E-004				2		X											
404	WR27E-005				2		X											
405	WR27E-006				2		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie	Sep 3/18 12:30		05 SEP 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 13

N°: AB 039572 A

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants

Same as COC#: 090059

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
406	WR23W-001	Soil	Sep 3/18		2		X											
407	WR23W-002	↓	↓		2		X											
408	WR23W-003				2		X											
409	WR23W-004				2		X											
410	WR23W-005				2		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Kim MacKenzie K. MacKenzie	Sep 3/18 12:30		05 SEP 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 3 of 3

N°: AB 039573 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: IEG / KCB

Courier: CANADIAN NORTH (Prepaid) Collect

Waybill# 518-YEV-10372924

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 2

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: —

Hydrocarbons: Earliest Expiry TOMORROW

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack (Bagged Ice) Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received 3.8°C

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 3.9+3.3+3.7=3.7 °C	2 (Bottle/Jar) 3.6+3.8+3.7=3.7 °C
3 (Bottle/Jar)___+___+___=___ °C	4 (Bottle/Jar)___+___+___=___ °C
5 (Bottle/Jar)___+___+___=___ °C	6 (Bottle/Jar)___+___+___=___ °C
7 (Bottle/Jar)___+___+___=___ °C	8 (Bottle/Jar)___+___+___=___ °C
9 (Bottle/Jar)___+___+___=___ °C	10 (Bottle/Jar)___+___+___=___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E38156

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: Samples 335-356 & 398-410: NO Vials rec'd.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH

518-YEV-10372924

Shipper's Name and Address / Nom et adresse de l'expéditeur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403.829-3098
Attn: Nicole Vella

Air Waybill / Lettre de transport aérien

Canadian North, 101 3711 32 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Consignee's Name and Address / Nom et adresse du destinataire

AGAT Laboratories Ltd
5310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Sue

Issuing Carrier's Agent Name and City / Nom et ville du Agent du transporteur émetteur

Agent's IATA Code / Code IATA de l'agent | Account Number / Numéro de compte

Airport of Departure (Address of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé
Inuvik

Accounting Information / Renseignements comptables

KLO150CW

IEG Consultants Ltd
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

To / à	By first carrier / Par premier transporteur	To / à	By / par	To / à	By / par
YEG	CANADIAN NORTH				

Currency	CHGS Code/Frais	WT / VAL		Other/Autres		Declared Value for Carriage / Valeur déclarée pour le transport	Declared value for Customs / Valeur déclarée pour la douane
		PPD / Payé	COLL / Dû	PPD / Payé	COLL / Dû		
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date / For Carrier Use Only
Vol, Date - Réservé au Transporteur

Amount of Insurance / Montant de assurance

Handling Information / Renseignements pour le traitement de l'expédition
HFPU
Keep Cool

SCI

No. of Pieces RCP / Nombre de colis ACP	Gross Weight / Poids brut	lb / k	Chargeable Weight / Poids de taxation	Rate / Charge Tarif / taxation	Item No.	Total	Commodity Item No. / No. d'article de la marchandise	Description of Goods (incl. Dimensions or Volume) / Description des marchandises (y compris dimensions ou volume)
2	52	K	52	7.57		$393.64	GAD	Soil Samples (non-haz) 60cm x 34cm x 70cm
2	52		52			$393.64		

Weight Charge / Prepaid / Porte payé: $393.64	Taxation au poids / Collect / Port dû
Valuation Charge	Taxation à la valeur
Tax: $25.98	Taxes
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier: $125.89	Total des autres frais dûs au
Total Prepaid / Total port payé: $545.51	Total collect / Total port dû
For Carrier's Use only at Destination / Réservé au transporteur à destination	Charges at Destination / Frais à l'arrivée

Other Charges / Autres frais
5T Fuel Surcharge = 98.41, 5T Nav Can Surcharge = 19.68, ACS Screening Fee = 7.80, GST/HST = 25.98

Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les mentions portées sur le présent document sont exactes et que dans la mesure où une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de l'expédition est correctement désignée et conditionnée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son agent

Executed on / Fait le: 04 Sep 2018 (Date) at / à YEV (Place / Lieu)

Signature of Issuing Carrier or its Agent / Signature du transporteur émetteur ou de son agent

Copy 3 shipper / consignee

518-YEV-10372924

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E382799

TRACE ORGANICS REVIEWED BY: Violet Yu, Lab Coordinator

DATE REPORTED: Sep 13, 2018

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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CANADA T6B 3P9
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FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E382799

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-07

DATE REPORTED: 2018-09-13

		SAMPLE DESCRIPTION:		EX18-150	EX18-151	EX18-152	EX18-153	EX18-154	EX18-155
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-09-04	2018-09-04	2018-09-04	2018-09-04	2018-09-05	2018-09-05
Parameter	Unit	G / S	RDL	9530086	9530113	9530114	9530115	9530116	9530117
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	0.18	<0.05	0.11	<0.05	2.74
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	10	<10	60	<10	20	<10
C16 - C34 (F3)	mg/kg		10	190	60	190	150	260	500
C34 - C50 (F4)	mg/kg		10	<10	<10	20	20	100	260
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	58	34	22	32	28	24
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		97	109	97	108	109	109
Ethylbenzene-d10 (BTEX)	%	50-150		114	110	86	96	94	103
o-Terphenyl (F2-F4)	%	50-150		105	105	93	101	103	106

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9530086-9530117 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E382799

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-07

DATE REPORTED: 2018-09-13

		SAMPLE DESCRIPTION:		WR23E-001	WR23E-002	WR23E-003	WR23E-004	WR23E-005	WR23E-006
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-09-05	2018-09-05	2018-09-05	2018-09-05	2018-09-05	2018-09-05
Parameter	Unit	G / S	RDL	9530118	9530121	9530122	9530123	9530124	9530125
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	230	160	130	250	220	230
C16 - C34 (F3)	mg/kg		10	380	240	260	380	340	300
C34 - C50 (F4)	mg/kg		10	50	20	30	60	30	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	16	13	12	13	14	17
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		108	108	97	108	109	95
Ethylbenzene-d10 (BTEX)	%	50-150		91	94	78	96	90	86
o-Terphenyl (F2-F4)	%	50-150		106	105	102	103	104	103

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9530118-9530125 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E382799

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 13, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1667	9531358	<0.005	<0.005	NA	< 0.005	96%	80%	120%	81%	80%	120%	95%	60%	140%
Toluene	1667	9531358	<0.05	<0.05	NA	< 0.05	98%	80%	120%	80%	80%	120%	94%	60%	140%
Ethylbenzene	1667	9531358	<0.01	<0.01	NA	< 0.01	100%	80%	120%	92%	80%	120%	102%	60%	140%
Xylenes	1667	9531358	<0.05	<0.05	NA	< 0.05	98%	80%	120%	83%	80%	120%	93%	60%	140%
C6 - C10 (F1)	1667	9531358	<10	<10	NA	< 10	109%	80%	120%	99%	80%	120%	105%	60%	140%
C10 - C16 (F2)	1144	9531358	<10	<10	NA	< 10	100%	80%	120%	95%	80%	120%	98%	60%	140%
C16 - C34 (F3)	1144	9531358	<10	<10	NA	< 10	101%	80%	120%	96%	80%	120%	102%	60%	140%
C34 - C50 (F4)	1144	9531358	<10	<10	NA	< 10	98%	80%	120%	93%	80%	120%	97%	60%	140%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E382799

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E382799
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG
Contact: Nicole Wills
Address: 500 -2618 Hopewell Place NE
Calgary, AB T1Y 7J7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By:

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim Mackenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☒ No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: I02018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☒ Samples Per Page
☐ Export

Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50
☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2
☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH
SK: BTEX/TVH/C11-C22, C23-C60
Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}
Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}
Routine Water Chemistry
Landfill: ☐ AB Class 2 ☐ BC ☐ SK
Coliforms: ☐ Total ☐ Fecal ☐ E.coli
Particle Size: ☐ Sieve (75µm) ☐ Texture
18 SEP 07 11:47
HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)
HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)

	LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	☒ CCME/AB : BTEX/F1-F4	☐ CCME/AB : BTEX/F1-F2
1	9530086	EX18-150		Sept 4/18	soil		3			X	
2	113	EX18-151					3			X	
3	114	EX18-152					3			X	
4	115	EX18-153					3			X	
5	116	EX18-154		Sept 5/18			3			X	
6	117	EX18-155					3			X	
7	118	WR23E-001					2			X	
8	121	WR23E-002					2			X	
9	122	WR23E-003					2			X	
10	123	WR23E-004					2			X	

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem	Sept 5/18		

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

N°: AB 090072

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E382799
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEC
Contact: Nicole Wills
Address: see page 1
Phone: Fax:
LSD:
Client Project #:
Sampled By:

Report Information
1. Name:
Email:
2. Name:
Email:
3. Name: see page 1
Email:

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☑ / No ☐
Company:
Contact:
Address: see page 1
Phone: Fax:
PO/AFE#:
Standing Offer #:

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☒ Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	18 SEP 07 11:47	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	124 WR23E-005		Sept 5/18	Soil		2				X										
2	125 WR23E-006		Sept 5/18	Soil		2				X										
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem	Sept 5/18		07 SEP 18

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 2

N°: AB 090071

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: KCB / IEG

Courier: CANADIAN N. (Prepaid) Collect

Waybill# 518-YEV-103503

Branch (EDM) GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry TERRACORES

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes No

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack (Bagged Ice) Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 1 + 8 + 10 = 10 °C

2 (Bottle/Jar)___+___+___=____ °C

3 (Bottle/Jar)___+___+___=____ °C

4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C

6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C

8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C

10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E382799

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: Samples 118-125' - Soil samply BTEX/F1-F4 were not Sampled using hermetic Sampling & meathanol field Stabilization.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

CANADIAN NORTH CARGO

518-YEV-10375013

Shipper's Name and Address
Nom et adresse de l'expediteur

IEG - Camp Farewell
PO Box 1038
Inuvik
Northwest Territories, Canada
403-829-3098
Attn: Nicole Wills

Not negotiable / Non négociable

Air Waybill / Lettre de transport aérien

Issued by / Émise par

Canadian North; 101 3731 52 Ave E,
Edmonton International Airport, AB,
Canada, T9E0V4

Copies 1, 2, 3 & 4 of this Air Waybill are originals and have the same validity.
Les exemplaires 1, 2, 3 et 4 de cette lettre de transport aérien sont originaux et ont la meme validité.

Consignee's Name and Address
Nom et adresse du destinaire

AGAT Laboratories Ltd
6310 Roper Road
Edmonton
Alberta, Canada
T6B 3P9 780 935 2525
Attn: Scot

It is agreed that the goods described herein are accepted for carriage in apparent good order and condition (except as noted) and SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY.
Il est convenu que les marchandises décrites dans le présent document sont acceptées pour le transport en bon état apparent (sauf annotation contraire) et que le transport est SOUMIS AUX CONDITIONS DU CONTRAT QUI FIGURENT AU VERSO. LES MARCHANDISES PEUVENT ÊTRE TRANSPORTÉES PAR TOUT AUTRE MOYEN Y COMPRIS PAR ROUTE OU PAR TOUT AUTRE TRANSPORTEUR À MOINS QUE DES INSTRUCTIONS CONTRAIRES PRÉCISES, À CE SUJET NE SOIENT DONNÉES PAR L'EXPÉDITEUR. L'ATTENTION DE L'EXPÉDITEUR EST ATTIRÉE SUR L'AVIS CONCERNANT LA LIMITATION DE RESPONSABILITÉ DU TRANSPORTEUR.

Issuing Carrier's Agent Name and City / Nom et ville de l'agent du transporteur émetter

Accounting Information / Renseignements comptables **KLO100CW**

IEG Consultants Ltd.
500 - 2618 Hopewell Place NE
Calgary
AB, Canada
T1Y 7J7
PO:

Agent's IATA Code / Code IATA de l'agent

Account Number / Numéro de compte

Airport of Departure (Addresss of First Carrier) and Requested Routing
Aéroport de départ (Adresse du premier transporteur) et itinéraire demandé

Inuvik

To / à	By first carrier / Par premier transport	To / à	by / par	To / à	by / par
YEG	CANADIAN NORTH				

Currency Monnaie	CHGS Code Frais	WT / Poids-Val PPD Payé	WT / Poids-Val COLL Du	Other/Autres PPD Payé	Other/Autres COLL Du	Declared Value for Carriage Valeur déclarée pour le transport	Declared value for Customs Valeur déclarée pour la douane
CDN	PX	X		X		NDV	NCV

Airport of Destination / Aéroport de destination
Edmonton

Flight Date - For Carrier Use Only
Vol. Date - Réservé au Transporteur

Amount of Insurance
Montant de lássurance

INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures box marked "Amount of Insurance"
ASSURANCE - si le transporteur propose une assurance et que l'expéditeur en fait la demande conformément aux présentes conditions, indiquer le montant à assurer en chiffres dans la case "Montant de l'assurance"

Handling Information / Renseignements pour le traitement de l'expedition
HFPU

SCI

No. of Pieces Nombre de colis RCP	Gross Weight Poids brut	kg lb	Chargeable Weight Poids de taxation	Rate / Charge Tarif / Montant	Interline	Total	Commodity Item No. No. d'article de la marchandise	Description of Goods (inc. Dimensions or Volume) Description des marchandises (y compris dimensions ou volume)
1	18	K	18	7.57		$136.26	GAD	Soil Samples 60cm x 33cm x 35cm

1 18 18 $136.26

Weight Charge / Prepaid / Porte payé	Taxation au poids / Collect / Port dû
$136.26	
Valuation Charge	Taxation à la valeur
Tax $9.23	Taxe
Total other Charges Due Agent	Total des autres frais dûs à l'agent
Total other Charges Due Carrier $48.38	Total des autres frais dûs au
Total Prepaid / Total port payé $193.87	Total collect / Total port dû

Other Charges / Autres frais

5T Fuel Surcharge = 34.07, 5T Nav Can Surcharge = 6.81, ACS Screening Fee = 7.50, GST/HST = 9.23

Shipper certifies that the particulars on the face hereof are correct and the insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.
L'expéditeur certifie que les indications portées sur le présent document sont exactes et que dans la mesure ou une partie quelconque de l'expédition contient des marchandises dangereuses, cette partie de d'expédition est correctement dénommée et bien préparée pour le transport par air conformément à la réglementation applicable.

Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent

06 Sep 2018 YEV

Executed on (Date) at (Place) / Fait le (Date) à (Lieu)

Signature of issuing Carrier or its Agent
Signature du Transporteur émetteur ou de son Agent

For Carrier's User only at Destination
Réservé au transporteur à destination

Charges at Destination / Frais à l'arrivée

Total Collect Charges / Total Du

518-YEV-10375013

Copy 2 shipper / consignee

Track online at CanadianNorth.com/Cargo/Track.

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: IEG CONSULTANTS LTD
500-2618 HOPEWELL PLACE NE
CALGARY, AB T1Y7J7
(403) 262-5505

ATTENTION TO: Nicole Wills

PROJECT: A04012A10

AGAT WORK ORDER: 18E384433

TRACE ORGANICS REVIEWED BY: Laarni Hafso, Laboratory Manager

DATE REPORTED: Sep 18, 2018

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-12

DATE REPORTED: 2018-09-18

SAMPLE DESCRIPTION:				EX18-156	EX18-157	EX18-158	EX18-159	EX18-160	EX18-161	EX18-162	EX18-163
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2018-09-06	2018-09-06	2018-09-06	2018-09-06	2018-09-06	2018-09-06	2018-09-08	2018-09-08
Parameter	Unit	G / S	RDL	9540869	9540870	9540871	9540872	9540873	9540874	9540875	9540876
Benzene	mg/kg		0.005	<0.005	0.023	<0.005	<0.005	<0.005	5.87	<0.005	<0.005
Toluene	mg/kg		0.05	4.19	1.91	1.74	2.13	0.91	192	3.77	4.29
Ethylbenzene	mg/kg		0.01	<0.01	0.03	<0.01	<0.01	0.06	68.8	0.02	<0.01
Xylenes	mg/kg		0.05	<0.05	0.14	0.08	<0.05	0.36	362	0.10	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	2000	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	1370	<10	<10
C10 - C16 (F2)	mg/kg		10	310	<10	<10	20	230	23100	20	20
C16 - C34 (F3)	mg/kg		10	420	180	70	190	260	4440	300	400
C34 - C50 (F4)	mg/kg		10	120	60	20	<10	30	2530	90	140
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	39	26	16	27	36	26	34	21
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	99	99	98	99	92	99	99
Ethylbenzene-d10 (BTEX)	%	50-150		147	136	91	110	124	126	132	103
o-Terphenyl (F2-F4)	%	50-150		96	82	91	103	79	76	103	103

Certified By:

AGAT Laboratories

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-12

DATE REPORTED: 2018-09-18

		SAMPLE DESCRIPTION:		EX18-164	EX18-165	EX18-166	EX18-167	EX18-168	EX18-169	EX18-170	EX18-171
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-09-08	2018-09-08	2018-09-08	2018-09-08	2018-09-08	2018-09-08	2018-09-10	2018-09-10
Parameter	Unit	G / S	RDL	9540877	9540878	9540906	9540907	9540908	9540909	9540910	9540911
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	2.42	<0.05	<0.05	0.05	<0.05	1.35
Ethylbenzene	mg/kg		0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	0.17	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	30	30	20	<10	<10	10	<10	20
C16 - C34 (F3)	mg/kg		10	420	570	480	10	10	480	20	90
C34 - C50 (F4)	mg/kg		10	160	210	200	<10	<10	170	<10	20
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	25	17	18	11	12	29	12	25
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		98	98	98	99	97	100	98	99
Ethylbenzene-d10 (BTEX)	%	50-150		131	92	97	101	102	114	101	101
o-Terphenyl (F2-F4)	%	50-150		103	110	84	85	94	101	85	89

Certified By:

AGAT Laboratories

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)

DATE RECEIVED: 2018-09-12

DATE REPORTED: 2018-09-18

		SAMPLE DESCRIPTION:		EX18-172	EX18-173	EX18-R162
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2018-09-10	2018-09-10	2018-09-08
Parameter	Unit	G / S	RDL	9540912	9540913	9540925
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2.16	0.78	0.38
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	0.06
C6 - C10 (F1)	mg/kg		10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	230	60
C16 - C34 (F3)	mg/kg		10	120	940	1170
C34 - C50 (F4)	mg/kg		10	40	110	400
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A
Moisture Content	%		1	31	54	28
Surrogate	Unit	Acceptable Limits				
Toluene-d8 (BTEX)	%	50-150		93	98	99
Ethylbenzene-d10 (BTEX)	%	50-150		104	122	120
o-Terphenyl (F2-F4)	%	50-150		85	80	91

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9540869-9540925 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

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TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-12

DATE REPORTED: 2018-09-18

		SAMPLE DESCRIPTION:		WR24-009	WR24-010	WR24-011	WR24-012	WR24-013	WR24-014	WR24-015	WR24-016
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2018-09-10	2018-09-10	2018-09-10	2018-09-10	2018-09-10	2018-09-10	2018-09-10	2018-09-10
Parameter	Unit	G / S	RDL	9540914	9540917	9540918	9540919	9540920	9540921	9540922	9540923
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	140	110	140	170	220	140	130	140
C16 - C34 (F3)	mg/kg		10	320	220	320	350	330	340	330	320
C34 - C50 (F4)	mg/kg		10	80	60	80	60	70	80	80	70
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	14	14	13	15	15	14	14	15
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		99	96	98	98	97	101	98	101
Ethylbenzene-d10 (BTEX)	%	50-150		99	94	96	95	88	101	95	96
o-Terphenyl (F2-F4)	%	50-150		96	85	87	85	79	87	85	90

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

CLIENT NAME: IEG CONSULTANTS LTD

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)

DATE RECEIVED: 2018-09-12

DATE REPORTED: 2018-09-18

		SAMPLE DESCRIPTION:		WR24-R016
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2018-09-10
Parameter	Unit	G / S	RDL	9540924
Benzene	mg/kg		0.005	<0.005
Toluene	mg/kg		0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01
Xylenes	mg/kg		0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10
C10 - C16 (F2)	mg/kg		10	140
C16 - C34 (F3)	mg/kg		10	330
C34 - C50 (F4)	mg/kg		10	80
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A
Moisture Content	%		1	17
Surrogate	Unit	Acceptable Limits		
Toluene-d8 (BTEX)	%	50-150		100
Ethylbenzene-d10 (BTEX)	%	50-150		93
o-Terphenyl (F2-F4)	%	50-150		85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

9540914-9540924 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 18, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Methanol Field Stabilized)															
Benzene	1913	9540873	<0.005	<0.005	NA	< 0.005	95%	80%	120%	81%	80%	120%	103%	60%	140%
Toluene	1913	9540873	0.91	0.82	10.4%	< 0.05	94%	80%	120%	80%	80%	120%	101%	60%	140%
Ethylbenzene	1913	9540873	0.06	0.05	18.2%	< 0.01	84%	80%	120%	81%	80%	120%	98%	60%	140%
Xylenes	1913	9540873	0.36	0.34	5.7%	< 0.05	89%	80%	120%	83%	80%	120%	100%	60%	140%
C6 - C10 (F1)	1913	9540873	<10	<10	NA	< 10	87%	80%	120%	95%	80%	120%	83%	60%	140%
C10 - C16 (F2)	983	9540873	230	250	8.3%	< 10	101%	80%	120%	88%	80%	120%	102%	60%	140%
C16 - C34 (F3)	983	9540873	260	300	14.3%	< 10	104%	80%	120%	81%	80%	120%	98%	60%	140%
C34 - C50 (F4)	983	9540873	30	50	NA	< 10	104%	80%	120%	94%	80%	120%	115%	60%	140%
Moisture Content	983	9540873	36	30	18.2%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS) (Non-Methanol Field Stabilized)															
Benzene	1813	9540156	<0.005	<0.005	NA	< 0.005	88%	80%	120%	92%	80%	120%	85%	60%	140%
Toluene	1813	9540156	<0.05	<0.05	NA	< 0.05	93%	80%	120%	96%	80%	120%	90%	60%	140%
Ethylbenzene	1813	9540156	<0.01	<0.01	NA	< 0.01	95%	80%	120%	107%	80%	120%	94%	60%	140%
Xylenes	1813	9540156	<0.05	<0.05	NA	< 0.05	97%	80%	120%	98%	80%	120%	90%	60%	140%
C6 - C10 (F1)	1813	9540156	<10	<10	NA	< 10	87%	80%	120%	106%	80%	120%	75%	60%	140%
C10 - C16 (F2)	1253	9540156	<10	<10	NA	< 10	90%	80%	120%	92%	80%	120%	90%	60%	140%
C16 - C34 (F3)	1253	9540156	<10	<10	NA	< 10	96%	80%	120%	83%	80%	120%	82%	60%	140%
C34 - C50 (F4)	1253	9540156	<10	<10	NA	< 10	96%	80%	120%	88%	80%	120%	88%	60%	140%
Moisture Content	1253	9540156	21	21	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: IEG CONSULTANTS LTD

AGAT WORK ORDER: 18E384433

PROJECT: A04012A10

ATTENTION TO: Nicole Wills

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
AGAT Job Number: 18E384433
Date and Time:

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: IEG
Contact: Nicole Wills
Address: 500-2618 Hopewell Place NE
Calgary, AB T1Y 7T7
Phone: 403-730-6809 Fax:
LSD:
Client Project #: A04012A10
Sampled By:

Report Information
1. Name: Stephanie Hannem
Email: shannem@klohn.com
2. Name: Nicole Wills
Email: nwills@klohn.com
3. Name: Kim MacKenzie
Email: kmackenzie@klohn.com

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Two Day / Next Day (100%) ☐ Three Day (50%) ☐ Four Day (25%)
Date Required:

SEE BACK FOR SURCHARGE BREAKDOWN. CONTACT YOUR CPM FOR ADDITIONAL INFORMATION

Invoice To Same Yes ☒ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:
Standing Offer #: IO2018-002

Requirements *(Selection may impact detection limits)*
☐ CCME ☐ AB Tier 1
☐ Agricultural ☐ Agricultural
☐ Industrial ☐ Industrial
☐ Residential/Park ☐ Residential/Park
☐ Commercial ☐ Commercial
☐ FWAL ☐ Natural Area
☐ Drinking Water ☐ Alberta Surface Water
☐ Other: ☐ Chronic ☐ Acute

Report Format
Single
☐ Sample Per Page
Multiple
☒ Samples Per Page
☐ Export

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS (FILTERED, PRESERVED, HAZARDOUS*) *ADDITIONAL FEE	# OF CONTAINERS VIALS / JARS	BAGS	BOTTLES	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50 ☒ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX /F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	18 SEP 12 13:36	HOLD FOR 30 DAYS NO ANALYSIS (Additional Fee)	HOLD FOR 30 DAYS AFTER ANALYSIS (Additional Fee)
1	9540869 EX18-156		Sept 6/18	Soil		3			X											
2	870 EX18-157					3			X											
3	871 EX18-158					3			X											
4	872 EX18-159					3			X											
5	873 EX18-160					3			X											
6	874 EX18-161					3			X											
7	875 EX18-162		Sept 8/18			3			X											
8	876 EX18-163					3			X											
9	877 EX18-164					3			X											
10	878 EX18-165					3	—	—	X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem SHannem	Sept 10/18		

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 2

N°: AB 090060

Document ID: DIV-50-1507.005.

Date Revised: May 10, 2018

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta
T2E 7P7
webearth.agatlabs.com
P: 403.735.2005 • F: 403.735.2771

Chain of Custody Record

Report to:

Company: IEG Consultants Same as COC#: 090060

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	# OF CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/F1-F4	Soil Metals ☐ HWS-B ☐ Cr^6 ☐ Hg	Water Metals ☐ Dissolved ☐ Total ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Soil Salinity (As Received)	Microtox	BTEXS/VPH/EPH ☐ LEPH/HEPH ☐	HOLD FOR 60 DAYS	PRESERVED (Y/N)	CONTAMINATED/HAZARDOUS (Y/N)
9540906	EX18-166	Soil	Sept 8/18		3		X											
907	EX18-167				3		X											
908	EX18-168				3		X											
909	EX18-169				3		X											
910	EX18-170		Sept 10/18		3		X											
911	EX18-171				3		X											
912	EX18-172				3		X											
913	EX18-173				3		X											
914	WR24-009				2		X											
917	WR24-010				2		X											
918	WR24-011				2		X											
919	WR24-012				2		X											
920	WR24-013				2		X											
921	~~WR24-014~~ WR24-014				2		X											
922	WR24-015				2		X											
923	WR24-016				2		X											
924	WR24-R016		Sept 10/18		2		X											
925	EX18-R162		Sept 8/18		3		X											

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Stephanie Hannem	Sept 10/18		12 SEP 18
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 2 of 2

Nº: AB 039579 A

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: JEG / KCB

Courier: CANADIAN N. (Prepaid) Collect

Waybill# 518-YEV-10378351

Branch (EDM) GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes (No)

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other_____

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry TGRTACopies

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 6.9+7.2+6.8=7.0 °C 2(Bottle/Jar)___+___+___=____ °C

3 (Bottle/Jar)___+___+___=____ °C 4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C 6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C 8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C 10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 18E384433

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

518-YEV-10378351

CANADIAN NORTH

Air Waybill / Lettre de transport aérien

Inuvik

YEG	CANADIAN NORTH	CDN	PX
Edmonton		NOV	NCV

HOLD & NOTIFY
KEEP COOL

1	24	24		$181.68

Weight Charge Prepaid / Port payé	Taxation au poids Collect / Port dû	Other Charges / Autres frais
$181.68		ST Fuel Surcharge = 45.42, ST Nav Can Surcharge = 9.05, ACS Screening Fee = 7.50, GST/HST = 12.18
Valuation Charge	Taxation à la valeur	
Tax	Taxe	
$12.18		
Total other Charges Due Agent	Total des autres frais dûs à l'agent	
Total other Charges Due Carrier	Total des autres frais dûs au	
$62.00		
Total Prepaid / Total port payé	Total collect / Total port dû	Signature of Shipper or his Agent / Signature de l'expéditeur ou de son Agent
$255.86		11 Sep 2018 YEV
For Carrier's Use only at Destination	Charges at Destination / Frais à l'arrivée	Total Collect Charges / Total Dû

Copy 2 shipper / consignee

518-YEV-10378351

Track online at CanadianNorth.com/Cargo/Track

APPENDIX XI

Borehole Logs

BORE HOLE LOG - ENVIRONMENTAL **BH18-01**

CLIENT: Shell Canada Energy	PROJECT: 2018 Remediation Program Report	
LOCATION: Airstrip	PROJECT NO.: A04012A10	DATE: July 29, 2018
CO-ORDINATES: E 496487.9 N 7677813.5	GROUND ELEVATION: Not Measured	CASING ELEVATION: N/A
HOLE DIA.: 2"	CASING DIA.: N/A	TOTAL DEPTH OF HOLE: 1.1 m
DRILLING METHOD: Dutch Auger	DRILLING CONTRACTOR: N/A	
LOGGED BY: SH	CHECKED BY: KM	Page 1 of 1

DEPTH (m)	SYMBOL	MATERIAL DESCRIPTION	WELL CONSTRUCTION	COMMENTS	SAMPLE TYPE	◆ OVA (ppm) 100 300 500 700 900
		GRAVEL FILL (GW) coarse (max. 25 mm), sandy, well graded, loose, subangular, brown, moist, poor recovery			Jar	◆130
				Backfilled with hand-augered soil		◆10
		At 0.6 m: wet			Jar	◆10
1		PEAT (PT) soft, black, moist				
		End of Hole at: 1.10 m				

BORE HOLE LOG - ENVIRONMENTAL **BH18-02**

CLIENT: Shell Canada Energy	PROJECT: 2018 Remediation Program Report	
LOCATION: Airstrip	PROJECT NO.: A04012A10	DATE: July 29, 2018
CO-ORDINATES: E 496412.3 N 7677836.5	GROUND ELEVATION: Not Measured	CASING ELEVATION: N/A
HOLE DIA.: 2"	CASING DIA.: N/A	TOTAL DEPTH OF HOLE: 0.9 m
DRILLING METHOD: Dutch Auger	DRILLING CONTRACTOR: N/A	
LOGGED BY: SH	CHECKED BY: KM	Page 1 of 1

DEPTH (m)	SYMBOL	MATERIAL DESCRIPTION	WELL CONSTRUCTION	COMMENTS	SAMPLE TYPE	◆ OVA (ppm) 100 300 500 700 900
		GRAVEL FILL (GW) coarse (max. 25 mm), sandy, well graded, loose, subangular, brown, moist, poor recovery				◆ 5
				Backfilled with hand-augered soil	Jar	◆ 5
		At 0.6 m: wet			Jar	◆ 5
		End of Hole at: 0.90 m				
1						

BORE HOLE LOG - ENVIRONMENTAL **BH18-03**

CLIENT: Shell Canada Energy	PROJECT: 2018 Remediation Program Report	
LOCATION: Airstrip	PROJECT NO.: A04012A10	DATE: July 29, 2018
CO-ORDINATES: E 496349.2 N 7677858.1	GROUND ELEVATION: Not Measured	CASING ELEVATION: N/A
HOLE DIA.: 2"	CASING DIA.: N/A	TOTAL DEPTH OF HOLE: 0.9 m
DRILLING METHOD: Dutch Auger	DRILLING CONTRACTOR: N/A	
LOGGED BY: SH	CHECKED BY: KM	Page 1 of 1

DEPTH (m)	SYMBOL	MATERIAL DESCRIPTION	WELL CONSTRUCTION	COMMENTS	SAMPLE TYPE	◆ OVA (ppm) 100 300 500 700 900
		GRAVEL FILL (GW) coarse (max. 25 mm), sandy, well graded, loose, subangular, brown, moist, trace organics, poor recovery		Backfilled with hand-augered soil	Jar	◆ 5
						◆ 5
		At 0.6 m: wet			Jar	◆ 5
		End of Hole at: 0.90 m				
1						

BORE HOLE LOG - ENVIRONMENTAL **BH18-04**

CLIENT: Shell Canada Energy	PROJECT: 2018 Remediation Program Report	
LOCATION: Airstrip	PROJECT NO.: A04012A10	DATE: July 29, 2018
CO-ORDINATES: E 496212.3 N 7677900.1	GROUND ELEVATION: Not Measured	CASING ELEVATION: N/A
HOLE DIA.: 2"	CASING DIA.: N/A	TOTAL DEPTH OF HOLE: 0.9 m
DRILLING METHOD: Dutch Auger	DRILLING CONTRACTOR: N/A	
LOGGED BY: SH	CHECKED BY: KM	Page 1 of 1

DEPTH (m)	SYMBOL	MATERIAL DESCRIPTION	WELL CONSTRUCTION	COMMENTS	SAMPLE TYPE	◆ OVA (ppm) 100 300 500 700 900
		GRAVEL FILL (GW) coarse (max. 25 mm), sandy, well graded, loose, subangular, brown, wet, poor recovery				◆0
		At 0.3 m: gray				
		At 0.4 m: water table		Backfilled with hand-augered soil	Jar	◆20
		PEAT (PT) soft, black, moist		Sample collected from peat interval (0.7-0.9 m bgs)	Jar	◆20
		End of Hole at: 0.90 m				
1						

BORE HOLE LOG - ENVIRONMENTAL **BH18-05**

CLIENT: Shell Canada Energy	PROJECT: 2018 Remediation Program Report	
LOCATION: Airstrip	PROJECT NO.: A04012A10	DATE: July 29, 2018
CO-ORDINATES: E 496072.1 N 7677939.3	GROUND ELEVATION: Not Measured	CASING ELEVATION: N/A
HOLE DIA.: 2"	CASING DIA.: N/A	TOTAL DEPTH OF HOLE: 0.9 m
DRILLING METHOD: Dutch Auger	DRILLING CONTRACTOR: N/A	
LOGGED BY: SH	CHECKED BY: KM	Page 1 of 1

DEPTH (m)	SYMBOL	MATERIAL DESCRIPTION	WELL CONSTRUCTION	COMMENTS	SAMPLE TYPE	◆ OVA (ppm) 100 300 500 700 900
		GRAVEL FILL (GW) coarse (max. 25 mm), sandy, well graded, loose, subangular, brown, moist		Backfilled with hand-augered soil	Jar	◆ 0
					Jar	◆ 0
		At 0.7 m: poor recovery				◆ 0
1		End of Hole at: 0.90 m				