



SNC • LAVALIN

PHASE III ENVIRONMENTAL SITE ASSESSMENT

Butter Pot Provincial Park, NL

Department of Environment and Conservation



INFRASTRUCTURE AND BUILDINGS

September | 2015

REPORT > FINAL

Rev. 1 > Internal ref. 620891

FINAL REPORT

**PHASE III ENVIRONMENTAL SITE ASSESSMENT
BUTTER POT PROVINCIAL PARK
NEWFOUNDLAND AND LABRADOR**

Prepared for:

Pollution Prevention Division
Department of Environment and Conservation
Government of Newfoundland and Labrador
4th Floor, West Block
Confederation Building
P.O. Box 8700
St. John's, NL
A1B 4J6

Prepared by:

SNC ♦ LAVALIN INC.
1133 Topsail Road
Mount Pearl, NL A1N 5G2

September 2015

EXECUTIVE SUMMARY

In January 2015, SNC-Lavalin Inc. (SLI) was retained by the Department of Environment and Conservation (DEC) to conduct a Phase Three (III) ESA at the Diesel Generator Site within Butter Pot Provincial Park, NL. The purpose of the work was to further assess the extent of soil petroleum hydrocarbon contamination in the vicinity of the known contaminated area at the site.

The objective of the Phase III ESA was to further delineate the extents of the hydrocarbon impacted soil area and determine if identified hydrocarbon impacts have contaminated the groundwater at the site. Where environmental impacts were identified in previous investigations, delineation sampling for the identified chemicals of potential concern was undertaken. The samples were submitted to a laboratory certified by the Canadian Association of Laboratory Accreditation (CALA). Analytical results were then compared to applicable guidelines to determine the presence or absence of potential environmental contamination.

Site Description

The site is located at Butter Pot Provincial Park along the Trans Canada Highway approximately 20 km west of St. Johns, NL.

There are four building structures within the workshop/main generator area of the park, which include a warm-up building, a workshop, a storage shed and a generator shed. There is a steel diesel aboveground storage tank (AST) adjacent to the east side of the generator shed. When in operation, the diesel generator, which is owned by the park and stored inside the generator shed, is connected to this AST. The diesel AST is stationed on a concrete pad.

Site Visit

The Phase III ESA was carried out during the months of January, May and June 2015. The investigation included a review of historical information, an inspection of the property, and a soil, groundwater and potable water sampling program.

Phase III ESA Conclusions

Based on the information gathered and on observations made during this investigation conclusions of the Phase III ESA conducted by SLI include:

- Results of the soil sampling program revealed concentrations of petroleum hydrocarbon F2 fractions in soil samples Test Pit 1 (Bottom) (350 mg/kg) and Test Pit 2 (Surface) (570 mg/kg) above the Atlantic RBCA Tier 1 Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates for a commercial site (260 mg/kg).

- The potential ecological risks at the Site include direct contact to plants and soil invertebrates in petroleum hydrocarbon contaminated soil exceeding the Atlantic RBCA Tier 1 Soil Ecological Screening Levels. The potential risk to aquatic life in nearby water bodies is minimal as the concentrations in groundwater were non-detect. The risk to terrestrial vertebrate animals such as mammalian or avian wildlife is also minimal, as petroleum hydrocarbons are readily metabolized by vertebrates into an excretable form, and thus do not accumulate. In addition, PHC are not readily absorbed into and accumulated by plant tissues, therefore consumption of plants or other animals does not constitute a major component of exposure for petroleum hydrocarbons in wildlife.
- Results of the soil sampling program revealed that all samples submitted for PAHs were reported as non-detect.
- Results of the groundwater sampling program revealed that all samples (MW-1 – MW-4) submitted for BTEX/TPH and PAHs were reported as non-detect.
- Results of the potable water sampling program revealed that the sample (TAP-1) submitted for BTEX/TPH and PAHs was reported as non-detect and therefore below the applicable Health Canada Drinking Water Quality Guidelines. This report however is not stating that the potable water is safe to drink as other forms of contamination not related to the historic spills at the site may be present in the potable well. Based on the analytical results, groundwater in the potable well does not seem to be contaminated from the historic spills at the site. Water lines consisting of metal or plastic pipes are generally impermeable unless they leak. Since the pipeline is, under pressure, any leaks will push water out through the break in the pipe. Therefore, it is unlikely that underground contamination would be able to enter the pipeline that is connected to the warm-up building.
- Results from the SLI soil sampling program have achieved horizontal and vertical delineation within the proposed sampling areas southeast and southwest of the generator shed. Based on this information the estimated area of petroleum hydrocarbon impacts within these areas of the site is approximately 170 m² with an approximate volume of 250 m³.
- Horizontal and vertical delineation has not been achieved to the northeast of the generator shed. Based on the petroleum hydrocarbon concentrations identified from the November 2011 CBCL Sub-Surface Assessment at soil sample locations TP3 and TP4 the potential exists that petroleum hydrocarbon contamination may have migrated underneath the foundation of the work shed. It is very unlikely that the hydrocarbon contamination in these areas have degraded to acceptable provincial guidelines as the hydrocarbon fractions identified in the F2 and F3 range degrade slowly.

Recommendations

Based on the results of the Phase III ESA at the Butter Pot Park Site, the following is recommended:

- Perform additional delineation of potential BTEX/TPH and PAHs impacts in soil underneath the foundation of the work shed located northeast of the generator shed by collecting soil samples using a drill rig capable of angle drilling beneath the buildings footprint. Adequate delineation will provide the information needed to support appropriate decisions about contaminant remediation and management for the site and also allow all applicable exposure pathways and receptors to be properly assessed. Complete delineation of the site will also ensure that the contaminant level is stable with regard to fate and mobility of the contaminants of potential concern (COPC) and the stability of the COPC in the environmental media. As a result, it is highly recommended that complete delineation must be accomplished prior to finalizing any environmental quality remediation criteria or risk assessment for the site.
- Conduct an indoor air sampling program to assess current human health risks associated with inhalation exposure to potentially petroleum hydrocarbon impacted indoor/outdoor air within the four (4) building structures located at the site. Based on TPH concentrations within the subsurface soil indicated from the 2011 CBCL soil investigation, the indoor air pathway is considered operable for all building structures located at the site. It is clear that the buildings on-site have no concrete slab and because of this do not meet the mandatory default conditions of the Atlantic RBCA indoor air model, therefore the Tier 1 Risk Based Screening Levels and Tier II Pathway Specific Screening Level Tables do not apply. As a result, indoor air samples for petroleum hydrocarbons will have to be compared to Risk Specific Concentration and Reference Dose Concentrations taken from the Atlantic RBCA document titled “*Guidance for Soil Vapour and Indoor Air Monitoring Assessments*”, July 2006.
- Remove the wooden walls of the generator shed contaminated with petroleum hydrocarbons to prevent any further soil contamination and ensure a safe working environment for park employees. Petroleum hydrocarbons can pose a fire/explosion hazard, especially if vapours are present in a confined space.

TABLE OF CONTENTS

	Page No.
EXECUTIVE SUMMARY	1
1 INTRODUCTION.....	1
1.1 Objectives.....	1
1.2 Scope of Work.....	1
2 SITE INFORMATION	1
2.1 Property.....	1
2.1.1 On-site Building and Structures	2
2.2 Topography and Regional Drainage.....	3
3 BACKGROUND INFORMATION (DIESEL SPILL)	3
4 PREVIOUS ENVIRONMENTAL REPORTS	3
4.1 Phase II ESA (ADI Limited, April 2009).....	3
4.2 Soil Remediation program (AMEC, July 2009).....	4
4.3 Sub-Surface assessment (CBCL, November 2011)	5
5 ENVIRONMENTAL QUALITY GUIDELINES	6
5.1 Soil.....	6
5.2 Groundwater	6
5.3 Ecological Screening Protocol	7
6 SITE VISIT AND EVALUATION OF FINDINGS	7
6.1 Site Visit	7
6.2 Phase III ESA Methodology.....	8
6.2.1 Sample Handling	8
6.2.2 Test Pit Sampling Program.....	9
6.2.3 Monitoring Well Installation.....	9
6.2.4 Groundwater Sampling Program	9
6.2.5 Potable Water Sampling.....	11
6.2.6 Surveying	11
6.2.7 Quality Assurance / Quality Control (QA/QC) Sampling Program	12
6.3 Results of Field Investigation	12
6.3.1 Field Observations	12
6.3.2 Stratigraphy.....	12
6.3.3 Groundwater Conditions.....	12
6.3.4 Soil Vapour Concentrations.....	13
6.4 Laboratory Analytical Results for Soil	13
6.4.1 BTEX/TPH in Soil.....	14
6.4.2 PAHs in Soil	14
6.5 Laboratory Analytical Results for Groundwater	14
6.5.1 Field Measured Parameters	15
6.5.2 BTEX/TPH in Groundwater	15
6.5.3 PAHs in Groundwater.....	16
7 DISTRIBUTION OF CONTAMINATION	16
7.1 Distribution of Petroleum Hydrocarbon in Soil.....	16
7.2 Quality Assurance / Quality Control Discussion	17

8	CONCLUSIONS OF THE PHASE III ESA.....	18
9	RECOMMENDATIONS	19
10	CLOSURE.....	20
11	REFERENCES.....	22

List of Tables:

Table 2-1: On-Site Structures.....	2
Table 5-1: Regulatory Documents for Soil.....	6
Table 5-2: Regulatory Guidance Documents for Groundwater	6
Table 6-1: Groundwater Level and Free Product Results, June 2015	10
Table 6-2: Sample Location Coordinates (NAD83 datum, UTM Zone 22)	11
Table 6-3: Summary of Phase III ESA Laboratory Analytical Program	13
Table 6-4: Summary of Groundwater Laboratory Analytical Program.....	15
Table 6-5: Field Parameter Data (June 9, 2015)	15
Table 11-1: References.....	22

List of Appendices:

- Appendix A - Site Figures
- Appendix B - Photographic Record
- Appendix C - Laboratory Certificates
- Appendix D - Analytical Summary Tables
- Appendix E - QA/QC Program
- Appendix F - Test Pit Logs
- Appendix G - Monitoring Well Logs
- Appendix H - Ecological Screening Protocol

1 INTRODUCTION

1.1 OBJECTIVES

In January 2015, SNC-Lavalin Inc. (SLI) was retained by the Department of Environment and Conservation (DEC) to conduct a Phase Three (III) ESA at the Diesel Generator Site within Butter Pot Provincial Park, NL. The purpose of the work was to further assess the extent of soil petroleum hydrocarbon contamination in the vicinity of the known contaminated area at the site. The objectives of the proposed work at the above-mentioned property included:

- Further delineate the extents of the hydrocarbon impacted soil area;
- Determine if identified hydrocarbon impacts have contaminated the groundwater; and
- Analyze the results of the soil delineation and groundwater quality monitoring and prepare a final report including detailed recommendations for either remediation or risk assessment.

The following report presents a description of the subject property, location, a summary of findings, and recommendations. Report appendices include: Figures (A), Photographic Record (B), Laboratory Certificates (C), Analytical Summary Tables (D), QA/QC Program (E), Test Pit Logs (F), Monitoring Well Logs (G) and Ecological Screening Protocol (H).

1.2 SCOPE OF WORK

The scope of work for the Phase III ESA included:

- Review of historical records provided by DEC;
- A site inspection of the property;
- Phase III intrusive soil and groundwater sampling to investigate the findings of the previous site investigations; and,
- Collection of a potable water sample from one of the site building structures.

2 SITE INFORMATION

2.1 PROPERTY

The site is located at Butter Pot Provincial Park along the Trans Canada Highway approximately 20 km's west of St. Johns, NL. Based on information provided by DEC, the Site is currently owned and operated by the Parks and Natural Areas Division of the Department of Environment

and Conservation (ENVC), Government of NL. The general Site location is presented on Figure 1, Appendix A.

The majority of the Site exterior area is surfaced with gravel with some areas of grass, moss and shrubs. The ground surface on-Site gently slopes downward to the north towards a gravel parking area. A large pond (Trailer Pond) is located approximately 150 m west of the Site. A small stream is located approximately 200 m southeast of the Site which flows in a north-easterly direction along the west side of the highway on ramp towards a small pond located northeast of the park access road.

There is a drinking water well near the park office building which is located approximately 80 m south of the generator shed. The well provides potable water to Park staff and campground users. There is an underground plastic waterline located along a trail that is situated south of the generator shed which connects the well to the warm-up building (refer to Figure 1, Appendix A).

2.1.1 On-site Building and Structures

There are four building structures within the workshop/main generator area of the park, which include a warm-up building, a workshop, a storage shed and a generator shed. It should be noted that none of these structures contain a concrete foundation. There is a steel diesel aboveground storage tank (AST) adjacent to the east side of the generator shed (Refer to Figure 1, Appendix A). When in operation, the diesel generator, which is owned by the park and stored inside the generator shed, is connected to this AST. The diesel AST is stationed on a concrete pad.

A summary of the on-site structures are provided in Table 2-1.

Table 2-1: On-Site Structures

Structure	Description
Butter Pot Provincial Park	
Warm-Up Building	Approximately 12 m x 11.5 m building constructed of green painted wooden exterior siding. The structures interior framing and floor also consists of wood.
Storage Shed	Approximately 14 m x 9 m building constructed of wooden exterior siding (not painted). The structures interior framing also consists of wood with a crushed stone floor.
Generator Shed	Approximately 4 m x 2.5 m building constructed of green painted wooden exterior siding. The structures interior framing also consists of wood with a gravel floor.
Workshop	Approximately 12.5 m x 12.5 m building constructed of green painted wooden exterior siding. The structures interior framing and floor also consists of wood.

2.2 TOPOGRAPHY AND REGIONAL DRAINAGE

Based on visual observations and topographic mapping for the Site area, surface drainage appears to flow both to the north and south throughout the site. The ground surface slope varies to the north and south throughout the site.

3 BACKGROUND INFORMATION (DIESEL SPILL)

According to background information provided by DEC, a portable diesel generator was rented from United Rentals on May 15, 2009 for use at the park over the Victoria holiday weekend. The portable generator was placed on the north side of the generator shed, in close proximity to the shed door, and was connected to the 2,273 L diesel AST. A leak from the United Rentals generator was reportedly discovered on May 18, 2009 by park staff. The fuel supply and generator were immediately shut-off and the leak was reported to United Rentals. A local company that routinely services the park owned generator was called to the Site to assist with stopping the leak. Upon inspection, it appeared that a crack had formed in the fuel filter inside the generator casing causing diesel fuel to spray out of the generator casing, under pressure, onto the ground surface underneath the generator.

According to the Park Manager, it was estimated that approximately 100 L to 150 L of diesel oil may have leaked from the generator before the fuel filter was replaced and the leak was stopped. Park staff attempted to absorb and contain the spilled diesel oil using several rolls of toilet paper, approximately 250 lb of sawdust and 12 bags of spill absorbent material. The surface soil within the spill area was reported to have been hand excavated by park staff with shovels and mixed with sawdust and absorbent material.

4 PREVIOUS ENVIRONMENTAL REPORTS

In preparation for the Phase III ESA program, SLI conducted a detailed review of several environmental assessments that have been carried out at the Site prior to the completion of the Phase III ESA by SLI. Results of these assessments are summarized in the following sections.

4.1 PHASE II ESA (ADI LIMITED, APRIL 2009)

A Phase II ESA was conducted by ADI Limited in March 2009 which involved the completion of four test pits and associated soil sampling at locations of potential environmental concern, as determined by surface soil staining in areas adjacent to the existing diesel generator and above ground storage tank. A summary of the conclusions and recommendations of the Phase II ESA is provided below.

- One or more BTEX components were detected in four of the seven soil samples analysed. Concentrations of ethyl benzene exceeding Atlantic RBCA Tier 1 guidelines for *Residential/Potable Water/Coarse-Grained Soil/Diesel/#2* were detected in four of the soil samples ranging from 0.12 mg/kg to 1.5 mg/kg. Concentrations of toluene exceeding Atlantic RBCA Tier 1 guidelines for *Residential/Potable Water/Coarse-Grained Soil/Diesel/#2* were detected in one soil sample at 7.3 mg/kg. BTEX components did not exceed guidelines for *Commercial/Potable Water/Coarse-Grain Soil/Diesel/#2*.
- TPH was also detected in four of the seven soil samples analysed exceeding Atlantic RBCA Tier 1 guidelines for *Residential/Potable Water/Coarse-Grained Soil/Diesel/#2* at concentrations ranging between 1800 mg/kg to 51000 mg/kg. Two of these samples also contained TPH concentrations exceeding guidelines for *Commercial/Potable Water/Coarse-Grain Soil/Diesel/#2*.
- Based on the findings of the investigation, ADI Limited recommended a Phase III ESA/site-specific Human Health Risk Assessment at the site to further delineate the extent of petroleum hydrocarbon contamination in soils/groundwater and to develop a remedial action plan for the site.

4.2 SOIL REMEDIATION PROGRAM (AMEC, JULY 2009)

AMEC Earth & Environmental was retained in May 2009 to conduct a Soil Remediation Program (SRP) in response to the Site diesel spill. The field program included the supervision and documentation of the removal, transportation and off-Site disposal/treatment of petroleum hydrocarbon impacted soil and the collection of confirmatory soil samples from the boundaries of the remedial excavation on-Site.

Impacted soil was excavated from the diesel generator spill area down to bedrock at depths ranging from approximately 1.4 m below ground surface (bgs) to 2.0 m bgs. Based on the soil disposal documentation provided to AMEC, 87.82 metric tonnes (i.e. six tandem-dump truck loads) of petroleum hydrocarbon impacted soil were transported from the Site for treatment and disposal. The excavation area measured approximately 28 m² with an average depth of 1.6 mbgs, for an approximate excavated soil volume of 45 m³ (i.e. approximately 90 metric tonnes).

Following the removal of approximately 90 metric tonnes of petroleum hydrocarbon impacted soil from the Site, soil samples were collected from the excavation area. A total of nine soil samples were collected from the upper and lower portion of the walls and from the floor of the remedial excavation. One soil sample was also collected from the shallow trench on the south side of the generator shed.

All stained soil in the area of the diesel generator spill was excavated and removed from the Site during the SRP. Based on the reported approximate quantity of diesel oil that had spilled

from the generator the preliminary Site inspection also revealed that there are other areas of pre-existing surface staining on-Site which may have resulted from the historic handling, storage and use of petroleum hydrocarbons. It was agreed that any further assessment and/or remediation of these areas would be the responsibility of the owner of the property, the Parks and Natural Areas Division of the ENVC and not United Rentals.

4.3 SUB-SURFACE ASSESSMENT (CBCL, NOVEMBER 2011)

CBCL Limited conducted a Sub-Surface Soil Assessment in September 2011 to evaluate the severity of petroleum hydrocarbon impacts at the Site in association with reported historical spill events. A summary of the conclusions and recommendations of the investigation is provided below.

- A total of twelve test pits were excavated in the vicinity of the generator shed and workshop. Test pits were terminated at depths ranging from 0.5 to 1.95 mbgs based upon bedrock refusal. Groundwater was not encountered during test pit activities.
- Measured organic vapour concentrations in the soil samples collected from the test pits ranged from 0 ppm to 420 ppm.
- Two selected soil samples from each test pit were submitted for BTEX and modified TPH analysis. Concentrations of toluene (ranging from 1.0 mg/kg-7.9 mg/kg) and xylenes (ranging from 12 mg/kg – 19 mg/kg) in two soil samples exceeded Atlantic RBCA Tier 1 guidelines for *Commercial/Potable Water/Coarse-Grain Soil/Diesel/#2*. Four of the samples also contained concentrations of ethyl benzene (ranging from 0.4 mg/kg – 3.0 mg/kg) and modified TPH (ranging from 10000 mg/kg – 54000 mg/kg) exceeding guidelines for *Commercial/Potable Water/Coarse-Grain Soil/Diesel/#2*.

Based on the results of the investigation, CBCL recommended the following:

- Drill four monitoring wells on the subject property to further assess and delineate petroleum impacts in groundwater and to determine if identified petroleum hydrocarbon impacts have impacted the groundwater.
- Conduct additional borehole activities to the southeast and southwest of the generator shed to delineate the identified hydrocarbon impacts vertically and horizontally.
- Once groundwater quality is obtained and soil delineation is complete determination can be made for a recommendation of either remediation or risk assessment.
- Collection of a potable water sample for laboratory analysis.

5 ENVIRONMENTAL QUALITY GUIDELINES

5.1 SOIL

Regulatory guidance documents used for comparison against soil results are shown in Table 5-1.

Table 5-1: Regulatory Documents for Soil

Media	Parameter (s)	Guideline
	PAHs	CCME - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Polycyclic Aromatic Hydrocarbons, 2010.
	BTEX/TPH	Atlantic RBCA (Risk-Based Corrective Action) for Petroleum Impacted Sites in Atlantic Canada, Version 3 (Updated January 2015)

5.2 GROUNDWATER

Regulatory guidance documents used for comparison against groundwater results are shown in Table 5-2.

Table 5-2: Regulatory Guidance Documents for Groundwater

Media	Parameter (s)	Guideline
Groundwater	PAHs	Ontario Ministry of the Environment – Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011)
		Health Canada – Guidelines for Canadian Drinking Water Quality (October 2014)
	BTEX/TPH	Atlantic RBCA (Risk-Based Corrective Action) for Petroleum Impacted Sites in Atlantic Canada, Version 3 (January 2015)
	BTEX	Health Canada – Guidelines for Canadian Drinking Water Quality (October 2014)

In the absence of both Federal and Provincial Guidelines, the Ontario Ministry of the Environment guidelines obtained from “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, (April 15, 2011) Table 6: Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition, where used as reference guidelines to assess PAHs in groundwater for the four (4) monitoring wells (MW-1 – MW-4) at the site.

5.3 ECOLOGICAL SCREENING PROTOCOL

In accordance with the Atlantic RBCA requirements, the Ecological Screening Protocol has been completed and is presented in Appendix H. Based on the completion of the protocol, additional action is required at the Site for further ecological assessment.

The ecological screening protocol is intended to determine whether chemical hazards, ecological receptors and/or exposure pathways are present at a given site. Completion of the protocol does not suggest that an ecological risk assessment (ERA) has been completed. Rather, the outcome of the protocol is a determination of whether or not an ERA or remediation/risk management should be conducted, and whether or not additional site data are required to conduct an ERA, or proceed with risk management options.

6 SITE VISIT AND EVALUATION OF FINDINGS

The following sections review the methodology, quality control/assurance procedures, field observations, and analytical results of the sampling program.

6.1 SITE VISIT

January 19, 2015

SLI personnel visited the subject property on January 19th, 2015 to collect soil samples and assess site conditions. Soil samples were collected during the Phase III ESA to investigate levels of petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) in soil and groundwater. During the time of the field investigation, the site was snow covered with weather conditions consisting of a mixture of sun and cloudy periods.

Due to the low hanging power lines connecting the building structures at the site, several proposed test pit locations were not able to be excavated during the January 19th site visit as they presented a safety hazard for the excavator operator. As a result, the remaining test pit locations were excavated at a later date with a smaller excavator that was able to maneuver in the areas of the low hanging wires.

March 23, 2015

On March 23, 2015, SLI personnel and Mr. Keith Brown (Park Manager) carried out a visual inspection to assess the snow conditions at the Diesel Generator Site within Butter Pot Provincial Park to determine when the remaining test pits could be excavated. The site visit revealed significant amounts of snowfall which raised several potential concerns for conducting any further work at the site.

Mr. Brown stated that he preferred that any further work at the site be delayed until most of the snow had melted. He was concerned that any heavy equipment such as a drill rig or excavator may damage snow buried equipment (ex. boats, building materials) that were located under the snow within the Diesel Generator Site.

Once all the snow had melted at the site, the remaining test pits were excavated and soil samples were collected on May 27th, 2015. The groundwater sampling program was later completed on June 9th, 2015.

The site location plan is provided in Appendix A. Photos of the site are located in Appendix B.

July 21, 2015

On July 21, 2015, SLI personnel met again with Mr. Keith Brown along with Jennifer Strickland and Dan Michielsen with the NL Department of Environment and Conservation Pollution Prevention Division. The purpose of the site visit was to determine if soil samples could be collected within the interior footprint of the workshop building to ensure complete delineation of petroleum hydrocarbon contaminated soil at the site could be achieved. Site observations revealed that in order for soil samples to be collected inside the building the wooden floor would have to be removed making soil sample collection very difficult and inconvenient for park employees to use the building.

While at the site, Mr. Brown stated that the wooden walls of the generator shed had become contaminated with petroleum hydrocarbons from historical fuel spillage occurring within and immediately adjacent to the shed. He mentioned that fumes from the walls were apparent during the warmer days of summer when inside the generator shed making it a potential safety concern for park employees.

Mr. Brown also stated that any potential soil removal in this area would require the generator to be shut-down and removed along with all electrical wiring connected to the shed. Mr. Brown assured that this would be a costly procedure and recommended that it should only be completed when the park camping season was closed as the generator is the main source of electricity for the park.

6.2 PHASE III ESA METHODOLOGY

6.2.1 Sample Handling

All samples collected for the soil and groundwater sampling program were collected using new nitrile gloves and clean equipment. Samples were collected directly into laboratory-dedicated bottles or baggies and sealed immediately after sample collection. Each sample was given a unique sample I.D., logged onto a chain-of-custody form, placed inside a cooler on ice and

transported to the laboratory for analysis. Any samples collected that did not require analysis were stored in the event that further analyses would be required.

6.2.2 Test Pit Sampling Program

Soil sampling completed during the January 2015 site visit was completed by a steel track excavator. During the May 2015 site visit a rubber tire backhoe was used to excavate the remaining test pits in the areas where the excavator was unable to safely work due to the low hanging wires throughout the site.

As each test pit was advanced, the ground profile was logged for soil type, moisture content and evidence of contamination. Soil sample locations are illustrated in Appendix A, Figure 2. Figure 2 also contains the historical sample locations from the November 2011 CBCL Sub-Surface Assessment Report. Test Pit logs for the Phase III ESA are provided in Appendix F.

Soil samples were collected from a total of nine (9) test pit locations at 0.5 meter depth intervals. One (1) soil sample was collected at the surface and continued at 0.5 meter depth intervals until bedrock was reached at each test pit location. In all, a total of fifteen (15) soil samples, including one (1) duplicate sample were submitted for BTEX/TPH and PAH analysis at the surface and bottom of seven (7) test pit sample locations. Based on the analytical results of soil samples submitted from test pits TP6 and TP7, samples from test pits TP8 and TP9 were not submitted as horizontal and vertical delineation for contaminants of concern had been achieved in these areas. Groundwater was not encountered during the soil sampling program.

6.2.3 Monitoring Well Installation

Logan's Drilling installed the monitoring wells at the site on May 25th and May 26th, 2015. Each monitoring well was constructed with 50 mm diameter 10 slot PVC screen and casing. The screen and the casing were threaded together and the bottom end of the screen was sealed with a PVC end point. A filter pack of "Native Soil" was placed in the annular space between the well screen and ground stratigraphic units and was back filled to ground level. The wellhead of each monitoring well was completed with a metal flush mounted manhole protector with a steel-plate cover. Monitoring well logs are provided in Appendix G.

Due to the shallow bedrock at the site, coring was required to install each monitoring well. As coring involves pumping water into the monitoring well borehole during drilling, a two-week wait period was required before each monitoring well could be sampled to ensure that the groundwater being tested was not the water pumped into each well during installation.

6.2.4 Groundwater Sampling Program

After each monitoring well was constructed, the well was developed manually with a dedicated Waterra sampling system by bailing the total volume of groundwater from the well. Well

development was carried out in order to remove as much fine grain material from around the well screen as possible, in attempt to collect sediment free groundwater samples. Bailed water collected during well development and sampling procedures was held in plastic containers until groundwater sampling procedures were completed and then this collected water was poured back into the originating monitoring well location.

Each well was purged prior to obtaining the groundwater samples. The depth to water and the total depth of the well were measured within each monitoring well so that the ground water volume could be calculated prior to purging each well. Water level measurements, including direct measurement of any existing light non-aqueous phase liquids (LNAPLs, or free product, if present) were conducted prior to sampling. Groundwater level measurements were carried out using an oil/water interface probe (Solinist Model 122). Gauging was conducted by lowering the clean probe down into each monitoring well until a tone was obtained indicating a liquid had been contacted. The depth at which a tone was first sounded was then carefully noted to the nearest millimeter. The groundwater volume was calculated based on the casing diameter and the height of water in each monitoring well. At each monitoring well, a minimum of three (3) times groundwater volume was removed during the purging process. Purging was completed at each monitoring well location with Waterra tubing and foot valves, and the quantity of water removed was recorded for each well.

Sample collection was conducted as soon as possible after purging the well. Samples were collected directly into pre-labelled laboratory supplied bottles. Prior to sample collection, field measurements were collected from each well location using a YSI multi-parameter water quality meter. Field measurements for Dissolved Oxygen (DO), conductivity, pH and temperature are presented in Table 6-5 of this report.

Free product was not identified in any of the gauged monitoring wells during the field program. A summary of the groundwater level measurements conducted is included in Table 6-1.

Table 6-1: Groundwater Level and Free Product Results, June 2015

Monitoring Well	Free Product Level (meters bgs)	Groundwater Level (meters bgs)	Free Product Thickness (cm)
MW-1	None Detected	5.97	0
MW-2	None Detected	4.48	0
MW-3	None Detected	3.34	0
MW-4	None Detected	3.56	0

Four (4) groundwater samples, including one (1) duplicate QA/QC sample, were submitted for BTEX/TPH and PAH analysis from the four (4) monitoring well sample locations.

Groundwater samples collected for volatile components were filled until a convex meniscus formed at the top of the vials, preventing any air space from existing in the vial. Once the vial

was closed, it was turned upside down to check for air space. Once the samples were collected they were immediately placed in a cooler and stored at approximately 4 degrees Celsius until they arrived at the laboratory.

6.2.5 Potable Water Sampling

A potable water sample was also collected from the sink faucet of the warm-up building and analysed for BTEX/TPH and PAHs. This potable water comes from a water line connected to a groundwater well located approximately 80 m south of the generator shed. Clean nitrile gloves were used to collect the samples. After collection, samples were placed in a cooler with ice and shipped to the laboratory for analysis; along with the chain of custody forms.

The water sample (TAP-1) collected for PAH and BTEX/TPH analysis from the warm-up building was compared to the Health Canada Guidelines for Canadian Drinking Water Quality.

6.2.6 Surveying

A GPS survey was completed during each site visit using a handheld Garmin eTrex Legend C GPS device. GPS measurements were recorded in NAD83 coordinates. Sampling location coordinates are presented in Table 6-2.

Table 6-2: Sample Location Coordinates (NAD83 datum, UTM Zone 22)

Location	Easting	Northing
TEST PIT SAMPLE LOCATION		
Test Pit 1 ¹	345687	5249687
Test Pit 2	345692	5249674
Test Pit 3	345696	5249666
Test Pit 4	345667	5249678
Test Pit 5	345676	5249668
TP6	345692	5249667
TP7	345703	5249675
TP8	345691	5249669
TP9	345705	5249679
MONITORING WELL SAMPLE LOCATION		
MW-1	345687	5249685
MW-2	345695	5249675
MW-3	345688	5249660
MW-4	345672	5249673
POTABLE WATER SAMPLE LOCATION		
TAP-1 ²	345658	5249712

¹Test pit locations labelled as presented in the Laboratory Analytical Certificates. Test Pit 1 -Test Pit 5 were excavated during the January 2015 site visit. TP6 – TP9 were excavated during the May 2015 site visit.

²Tap-1 was collected from the faucet sink of the warm-up building.

6.2.7 Quality Assurance / Quality Control (QA/QC) Sampling Program

The Quality Assurance/Quality Control (QA/QC) Program consisted of the collection of duplicate samples, laboratory duplicates, cleaning of sampling equipment between each sampling event, and the use of new nitrile gloves for each sample. All soil and water samples collected during the sampling program were given unique sample I.D.s, logged onto a chain-of-custody form, placed inside a cooler on ice and transported to the laboratory for analysis. Any samples collected that did not require analysis were stored in the event that further analyses were required.

Duplicate samples were collected at a 10% frequency for the Phase III ESA sampling program. Two (2) duplicate samples were collected for this site: soil sample Test Pit 10 (Surface) is a duplicate of soil sample Test Pit 1 (Surface); and groundwater sample MW-5 is a duplicate of MW-2. Section 7.2 and Appendix E provide information on the results of the QA/QC program.

The Laboratory QA/QC program consists of duplicates, matrix spikes, and blanks (See Appendix C). QA/QC samples for the laboratory are analyzed at a frequency of 15%. Maxxam Analytics Inc. does not specifically run QA/QC samples on a client-specific basis. Therefore, the laboratory does not specifically report sample I.D. numbers on their QA/QC results.

6.3 RESULTS OF FIELD INVESTIGATION

6.3.1 Field Observations

Soil conditions at the subject property consisted of bog type organics and common material including coarse grained sand, pebble and gravel.

No stressed or enhanced vegetation was observed during the site visits associated with the Phase III ESA program. Surface staining was not observed on any of the upland areas of the subject property during the recent field investigations.

6.3.2 Stratigraphy

Bedrock was encountered at each test pit location on site at depths ranging from 1.0 m to 1.9 m. No underground anomalies were encountered during sample collection.

No stressed vegetation was observed at the time of the field program.

6.3.3 Groundwater Conditions

No groundwater was encountered during the soil sampling program. The occurrence of free product floating in groundwater was not observed at any of the monitoring well locations at the time of the Phase III ESA groundwater sampling program. No standing water pools or large

puddles were observed on site. A pond is located in close proximity (approximately 185 m) southwest of the site.

6.3.4 Soil Vapour Concentrations

A PID meter was used to conduct a headspace analysis to detect if Volatile Organic Compounds (VOCs) were present in the surrounding soil of each sample location. Prior to taking the readings, the samples were placed in clear plastic bags, warmed to room temperature for 30 minutes, and then shaken to enhance volatilization. The headspace measurements were then taken by inserting the tip of the sampling instrument into each bag without contacting the soil or the side of each bag. VOCs were not detected in the samples collected.

6.4 LABORATORY ANALYTICAL RESULTS FOR SOIL

Maxxam Analytics Inc. in Mount Pearl, NL and Bedford, Nova Scotia performed all soil and water analyses. Maxxam is certified by the Canadian Association of Laboratory Accreditation (CALA). The laboratory analytical reports are presented in Appendix C. A summary of the laboratory analytical program for soil samples taken during the Phase III ESA is presented in Table 6-3.

Fifteen (15) soil samples (including one duplicate) were submitted for BTEX/TPH and PAHs.

Table 6-3: Summary of Phase III ESA Laboratory Analytical Program

Location	Sample ID	Depth (m)	Laboratory Submission
Soil Samples			
E 345687 N 5249687	TEST PIT 1 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TEST PIT 1 (BOTTOM)	1.5	BTEX/TPH, PAHs
E 345692 N 5249674	TEST PIT 2 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TEST PIT 2 (BOTTOM)	1.6	BTEX/TPH, PAHs
E 345696 N 5249666	TEST PIT 3 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TEST PIT 3 (BOTTOM)	1.9	BTEX/TPH, PAHs
E 345667 N 5249678	TEST PIT 4 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TEST PIT 4 (BOTTOM)	1.8	BTEX/TPH, PAHs
E 345676 N 5249668	TEST PIT 5 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TEST PIT 5 (BOTTOM)	1.0	BTEX/TPH, PAHs
E 345687 N 5249687	TEST PIT 10 (SURFACE) DUPLICATE OF TEST PIT 1 (SURFACE)	0-0.15	BTEX/TPH, PAHs
E 345692 N 5249667	TP6 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TP6 (1.5 m)	1.5	BTEX/TPH, PAHs
E 345703 N 5249675	TP7 (SURFACE)	0-0.15	BTEX/TPH, PAHs
	TP7 (1.9 m)	1.9	BTEX/TPH, PAHs
E 345691 N 5249669	TP8 (SURFACE)	0-0.15	NO LABORATORY SUBMISSION
	TP8 (1.8 m)	1.8	

Location	Sample ID	Depth (m)	Laboratory Submission
E 345705 N 5249679	TP9 (SURFACE)	0-0.15	NO LABORATORY SUBMISSION
	TP9 (1.8 m)	1.8	

Sample locations are shown in Appendix A, Figure 2. Laboratory Certificates are located in Appendix C. Analytical results for the soil samples collected during the site assessment are presented in Appendix D. Results were compared to the CCME - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Summary Tables; the CCME - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Polycyclic Aromatic Hydrocarbons; and the Atlantic RBCA (Risk-Based Corrective Action) for Petroleum Impacted Sites in Atlantic Canada Version 3.

6.4.1 BTEX/TPH in Soil

Fifteen (15) (including one duplicate) soil samples collected at the site were submitted for petroleum hydrocarbon analysis. The analytical results reported CCME petroleum hydrocarbon fraction F2 (C10-C16 range hydrocarbons) concentrations above the applicable ARBCA Ecological Assessment Commercial Guideline (260 mg/kg) in samples Test Pit 1 (Bottom) and Test Pit 2 (Surface). Analytical results for sample Test Pit 1 (Bottom) indicate a weathered fuel oil fraction resemblance. Soil sample Test Pit 2 (Surface) indicates a weathered fuel oil fraction and petroleum.

See Appendix D, Table 1 for petroleum hydrocarbon analytical results and comparison with applicable guidelines

6.4.2 PAHs in Soil

Results of the PAH analysis for the soil sampling program at the Site indicated that fifteen (15) (including one duplicate) soil samples analyzed had PAH concentrations that were non-detect and below the CCME Canadian Soil Quality Commercial Guidelines for the Protection of Environmental and Human Health guidelines. See Appendix D, Table 2 for Polycyclic Aromatic Hydrocarbons analytical results and comparison with applicable guidelines.

6.5 LABORATORY ANALYTICAL RESULTS FOR GROUNDWATER

Table 6-4 outlines the laboratory analytical program for the four (4) wells sampled during the groundwater monitoring program. All groundwater samples collected during the sampling program were given unique sample I.D.'s, logged onto a chain-of-custody form, placed inside a

cooler on ice and transported to the laboratory for analysis. Maxxam Analytics in St. John's, NL and Bedford, NS performed all analyses.

Table 6-4: Summary of Groundwater Laboratory Analytical Program

Well Number	Analysis
MW-1	BTEX/TPH and PAHs
MW-2	BTEX/TPH and PAHs
MW-3	BTEX/TPH and PAHs
MW-4	BTEX/TPH and PAHs
MW-5 (duplicate of MW-2)	TPH/BTEX

6.5.1 Field Measured Parameters

Field measured pH, temperature, conductivity and dissolved oxygen (DO) results for the four (4) monitoring wells sampled are included below in Table 6-5. Measurements were taken using a YSI 600QS water-quality probe and a clean sample jar containing representative well water.

Table 6-5: Field Parameter Data (June 9, 2015)

Location	Sample Date	Temp. (°C)	pH	Conductivity (µS/cm)	DO mg/L	Comments
MW-1	2015/6/9	12.32	5.55	0	9.82	Silty grey. No odour.
MW-2	2015/6/9	14.64	5.70	0	7.52	Silty grey. No odour.
MW-3	2015/6/9	10.64	5.57	0	13.77	Silty grey. No odour.
MW-4	2015/6/9	13.05	5.65	0	10.45	Silty grey. No odour

6.5.2 BTEX/TPH in Groundwater

Four (4) (including one duplicate) groundwater samples (MW-1 – MW-4) collected from monitoring wells at the site were submitted for petroleum hydrocarbon analysis. All groundwater samples analysed were non-detect for concentrations of petroleum hydrocarbons and below the applicable Atlantic RBCA Tier 1 guidelines.

See Appendix D, Table 3 for Petroleum Hydrocarbons analytical results and comparison with applicable Atlantic RBCA Tier 1 guidelines.

One (1) potable water sample (TAP-1) was also collected from the sink faucet of the warm-up building and analysed for BTEX/TPH. The sample analysed was non-detect for concentrations of petroleum hydrocarbons and below the applicable Health Canada Water Quality Guidelines.

See Appendix D, Table 4 for Petroleum Hydrocarbons analytical results and comparison with applicable Health Canada Water Quality guidelines.

6.5.3 PAHs in Groundwater

Four (4) groundwater samples (MW-1 – MW-4) collected at the site were submitted for PAH analysis. All groundwater samples analysed were non-detect for concentrations of PAHs and below the applicable Ontario Ministry of the Environment guidelines.

See Appendix D, Table 5 for PAH analytical results and comparison with applicable Ontario Ministry of the Environment guidelines.

Potable water sample (TAP-1) was also analysed for PAHs. The sample analysed was non-detect for concentrations of PAHs and below the applicable Health Canada Drinking Water Quality Guidelines.

See Appendix D, Table 6 for PAH analytical results and comparison with applicable Health Canada Drinking Water Quality guidelines.

7 DISTRIBUTION OF CONTAMINATION

7.1 DISTRIBUTION OF PETROLEUM HYDROCARBON IN SOIL

The Sub-Surface Assessment completed by CBCL (November 2011) reported concentrations of petroleum hydrocarbons above the Atlantic RBCA Tier I Soil Quality Guidelines for a commercial site.

Results of the CBCL soil sampling program at the site revealed eleven (11) soil samples containing concentrations of one or more of the following parameters (Toluene, ethyl benzene, xylenes, TPH, hydrocarbon fractions) exceeding either the Atlantic RBCA Tier I risk based screening levels for commercial soils and soil ecological screening levels for the Protection of Plants and Soil Invertebrates.

As a follow up from the recommendations of the CBCL report, SLI conducted additional soil sampling activities to delineate the identified hydrocarbon impacts vertically and horizontally southwest and southeast of the generator shed. Results of the SLI soil sampling program revealed two (2) soil samples exceeding the Atlantic RBCA Tier I soil ecological screening levels for the Protection of Plants and Soil Invertebrates.

As indicated in the proposed soil sampling program from the December 2014 SLI Phase III ESA proposal for the site, additional soil delineation to the southeast and southwest of the generator shed was conducted based on the recommendations from the 2011 CBCL Sub-Surface Assessment report. Results from the SLI soil sampling program have achieved horizontal and vertical delineation in these areas for the Atlantic RBCA Tier I Soil Quality Guidelines for a commercial site. All test pits from both the CBCL and SLI soil sampling programs were

terminated at depths ranging from 0 to 5 mbgs based upon bedrock refusal. Soil impacts within the site are present from 0.15 to 1.8 meters. Based on this information the estimated area of petroleum hydrocarbon impacts within these areas of the site is approximately 170 m² with an approximate volume of 250 m³.

However, it is still unknown if any hydrocarbon contamination has migrated to the northwest of the generator shed and beneath the foundation of the work shed due to the close proximity of the work shed to CBCLs test pit TP-3 which contained exceeding concentrations of petroleum hydrocarbons. As a result, both horizontal and vertical delineation has not been achieved in this area.

Based on the shallow depth to bedrock and analytical results from the immediate surrounding test pits in relation to CBCLs test pit TP-3, it is estimated that approximately 30 m³ of contaminated soil may have migrated and be present underneath the eastern section of the work shop foundation. However, only by conducting additional soil sampling to bedrock within the footprint of the work shop foundation will determine if hydrocarbon contamination is in fact present to establish if both horizontal and vertical delineation have been fully achieved.

In order to ensure complete delineation of the petroleum hydrocarbon contaminated soil to the northwest of the generator shed it is recommended that soil sampling be conducted within the footprint of the work shop. This can be accomplished using a drill rig capable of angle drilling. The drill rig can be positioned along the exterior foundation of the work shop and collect soil samples beneath its footprint using a split spoon sampler at various angles until shallow bedrock is reached. This will allow the collection of soil samples without any damage to the building structure and achieve delineation at the site.

Figure 3 presented in Appendix A presents both the 2011 CBCL's and 2015 SLI's analytical exceedances for soils and Figure 4 shows the estimated petroleum hydrocarbon impacted area. As previously stated in the report, no exceedances for PAHs in soil were reported at the site. As well, no exceedances were reported for petroleum hydrocarbons or PAHs in groundwater.

7.2 QUALITY ASSURANCE / QUALITY CONTROL DISCUSSION

The QA/QC program for the Phase III ESA consisted of:

- Collection of one (1) field duplicate soil sample for BTEX/TPH and PAH analysis;
- Collection of one (1) field duplicate groundwater sample for BTEX/TPH analysis;
- Analyses of lab duplicate blank and reference samples are completed as part of Maxxam Analytics' internal QA/QC procedures. Approximately 15% of samples analyzed by the laboratory are randomly selected for duplicate analysis; and

- Comparison and interpretation of analytical results of original samples and their corresponding duplicates.

Laboratory certificates for the soil sampling program are provided in Appendix C. Tabulated results of the sampling program, including duplicate samples, are presented in Appendix D. QA/QC results are presented in Appendix E.

Duplicate samples were collected at a 10% frequency for the entire sampling program. Two (2) duplicate samples were collected at the subject site.

Two (2) duplicate samples were collected for this site: soil sample Test Pit 10 (Surface) is a duplicate of soil sample Test Pit 1 (Surface); and groundwater sample MW-5 is a duplicate of MW-2

The comparison of duplicate soil sample Test Pit 10 (Surface) to the corresponding sample Test Pit 1 (Surface) resulted in a relative percent (%) difference of 0.

The comparison of duplicate groundwater sample MW-5 to the corresponding sample MW-2 also resulted in a relative percent (%) difference of 0.

Any differences in the sample duplicate may be due to the characteristics of the contaminants or the concentrations may not have been homogeneous throughout the sample. There are no firm guidelines for the degree of correlation expected between field duplicates due to natural heterogeneity.

8 CONCLUSIONS OF THE PHASE III ESA

Based on the information gathered and on observations made during this investigation conclusions of the Phase III ESA conducted by SLI include:

- Results of the soil sampling program revealed concentrations of petroleum hydrocarbon F2 fractions in soil samples Test Pit 1 (Bottom) (350 mg/kg) and Test Pit 2 (Surface) (570 mg/kg) above the Atlantic RBCA Tier 1 Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates for a commercial site (260 mg/kg).
- The potential ecological risks at the Site include direct contact to plants and soil invertebrates in petroleum hydrocarbon contaminated soil exceeding the Atlantic RBCA Tier 1 Soil Ecological Screening Levels. The potential risk to aquatic life in nearby water bodies is minimal as the concentrations in groundwater were non-detect. The risk to terrestrial vertebrate animals such as mammalian or avian wildlife is also minimal, as petroleum hydrocarbons are readily metabolized by vertebrates into an excretable form, and thus do not accumulate. In addition, PHC are not readily absorbed into and

accumulated by plant tissues, therefore consumption of plants or other animals does not constitute a major component of exposure for petroleum hydrocarbons in wildlife.

- Results of the soil sampling program revealed that all samples submitted for PAHs were reported as non-detect.
- Results of the groundwater sampling program revealed that all samples (MW-1 – MW-4) submitted for BTEX/TPH and PAHs were reported as non-detect.
- Results of the potable water sampling program revealed that the sample (TAP-1) submitted for BTEX/TPH and PAHs was reported as non-detect and therefore below the applicable Health Canada Drinking Water Quality Guidelines. This report however is not stating that the potable water is safe to drink as other forms of contamination not related to the historic spills at the site may be present in the potable well. Based on the analytical results, groundwater in the potable well does not seem to be contaminated from the historic spills at the site. Water lines consisting of metal or plastic pipes are generally impermeable unless they leak. Since the pipeline is, under pressure, any leaks will push water out through the break in the pipe. Therefore, it is unlikely that underground contamination would be able to enter the pipeline that is connected to the warm-up building.
- Results from the SLI soil sampling program have achieved horizontal and vertical delineation within the proposed sampling areas southeast and southwest of the generator shed. Based on this information the estimated area of petroleum hydrocarbon impacts within these areas of the site is approximately 170 m² with an approximate volume of 250 m³.
- Horizontal and vertical delineation has not been achieved to the northeast of the generator shed. Based on the petroleum hydrocarbon concentrations identified from the November 2011 CBCL Sub-Surface Assessment at soil sample locations TP3 and TP4 the potential exists that petroleum hydrocarbon contamination may have migrated underneath the foundation of the work shed. It is very unlikely that the hydrocarbon contamination in these areas have degraded to acceptable provincial guidelines as the hydrocarbon fractions identified in the F2 and F3 range degrade slowly.

9 RECOMMENDATIONS

Based on the results of the Phase III ESA at the Butter Pot Park Site, the following is recommended:

- Perform additional delineation of potential BTEX/TPH and PAHs impacts in soil underneath the foundation of the work shed located northeast of the generator shed by collecting soil samples using a drill rig capable of angle drilling beneath the buildings footprint. Adequate delineation will provide the information needed to support

appropriate decisions about contaminant remediation and management for the site and also allow all applicable exposure pathways and receptors to be properly assessed. Complete delineation of the site will also ensure that the contaminant level is stable with regard to fate and mobility of the contaminants of potential concern (COPC) and the stability of the COPC in the environmental media. As a result, it is highly recommended that complete delineation must be accomplished prior to finalizing any environmental quality remediation criteria or risk assessment for the site.

- Conduct an indoor air sampling program to assess current human health risks associated with inhalation exposure to potentially petroleum hydrocarbon impacted indoor/outdoor air within the four (4) building structures located at the site. Based on TPH concentrations within the subsurface soil indicated from the 2011 CBCL soil investigation, the indoor air pathway is considered operable for all building structures located at the site. It is clear that the buildings on-site have no concrete slab and because of this do not meet the mandatory default conditions of the Atlantic RBCA indoor air model, therefore the Tier 1 Risk Based Screening Levels and Tier II Pathway Specific Screening Level Tables do not apply. As a result, indoor air samples for petroleum hydrocarbons will have to be compared to Risk Specific Concentration and Reference Dose Concentrations taken from the Atlantic RBCA document titled "*Guidance for Soil Vapour and Indoor Air Monitoring Assessments*", July 2006.
- Remove the wooden walls of the generator shed contaminated with petroleum hydrocarbons to prevent any further soil contamination and ensure a safe working environment for park employees. Petroleum hydrocarbons can pose a fire/explosion hazard, especially if vapours are present in a confined space.

10 CLOSURE

This report has been prepared by SLI for Provincial Department of Environment and Conservation (DEC). It is intended for the sole and exclusive use of DEC, their affiliated companies and partners, and their respective insurers, agents, employees and advisors (collectively, "DEC"). Any use, reliance on or decision made by any person other than DEC based on this report is the sole responsibility of such other person. DEC and SLI make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, and decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by SLI with respect to this report and any conclusions or recommendations made in this report reflect SLI's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information

available at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, SLI requests notification so that we may decide if modifications to the findings, conclusions and recommendations in this report may be necessary.

Other than DEC, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of SLI. Nothing in this report is intended to constitute or provide a legal opinion.



Jason Green
Intermediate Site Professional



Keith Bartlett
Project Manager

11 REFERENCES

Table 11-1: References

Ref. No.	Date	Source	Item
1	2013	CSA Protocol Z769-00, Phase II ESA	CSA Protocol Z769-00, Phase II ESA
2	2007	Canadian Council of Ministers of the Environment	Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health
3	2015	Atlantic Risk Based Corrective Action – Version 3	Atlantic RBCA Version 3.0 for Petroleum Impacted Sites in Atlantic Canada Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada
4	2014	SNC-Lavalin Inc.	Proposal for Phase III Environmental Site Assessment, Butter Pot Park, NL, December 2014
5	2005	Government of Newfoundland and Labrador, Department of Environment and Conservation	Guidance Document for the Management of Contaminated Sites. Version 1.01
6	2011	Ontario Ministry of the Environment	Ontario Ministry of the Environment – Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011)
7	2008	Canadian Council of Ministers of the Environment	Canadian Council of Ministers of the Environment (CCME). 2008a. Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: User Guidance, Document PN 1398. January 2008.

APPENDIX A

Site Figures



Figure 1: Site Plan



SNC • LAVALIN

1133 TOPSAIL RD.,
MOUNT PEARL, NL, A1N 5G2

TEL: (709) 368-0118, FAX: (709) 368-3541

Project: PHASE III ESA

Location: BUTTER POT PROVINCIAL PARK

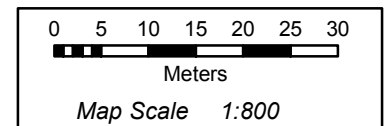
Client: NEWFOUNDLAND AND LABRADOR PARKS
AND NATURAL AREAS DIVISION

Created By: S. HILL

Reviewed By: J. GREEN




Project #: 620891

Date: Jul 2, 2015





Legend

-  Test Pit Locations (CBCL, 2011)
-  Test Pit Locations (SLI, 2015)
-  Monitoring Well Locations (SLI, 2015)

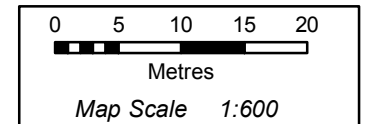
Note: Exceedances based on January 2015 RBCA Guidelines

Figure 2: Sample Plan


SNC • LAVALIN
 1133 TOPSAIL RD.,
 MOUNT PEARL, NL, A1N 5G2
 TEL: (709) 368-0118, FAX: (709) 368-3541

Project: PHASE III ESA
 Location: BUTTER POT PROVINCIAL PARK
 Client: NEWFOUNDLAND AND LABRADOR PARKS
 AND NATURAL AREAS DIVISION
 Created By: S. HILL Reviewed By: J. GREEN

Project #: 620891
 Date: Aug 28, 2015



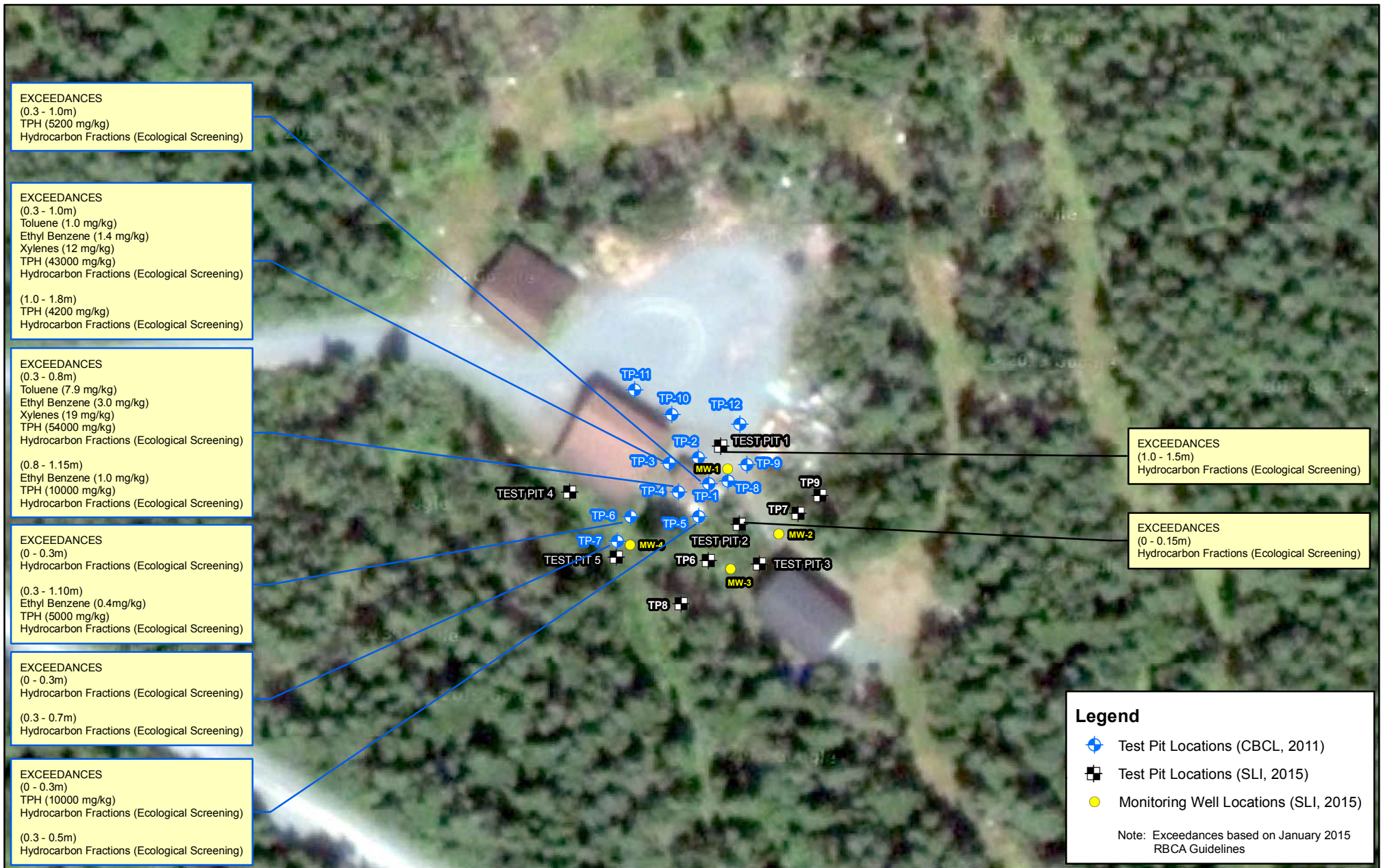


Figure 3: Sample Exceedances

Project: PHASE III ESA
 Location: BUTTER POT PROVINCIAL PARK
 Client: NEWFOUNDLAND AND LABRADOR PARKS AND NATURAL AREAS DIVISION
 Created By: S. HILL Reviewed By: J. GREEN

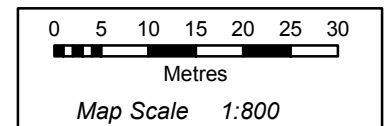
Project #: 620891
 Date: Aug 28, 2015



SNC • LAVALIN

1133 TOPSAIL RD.,
 MOUNT PEARL, NL, A1N 5G2

TEL: (709) 368-0118, FAX: (709) 368-3541





Legend


- ◆ Test Pit Locations (CBCL, 2011)
- Test Pit Locations (SLI, 2015)
- Monitoring Well Locations (SLI, 2015)
- ? Unknown Boundary of Hydrocarbon Impacts
- ▨ Aerial Extent of Hydrocarbon Impacts (estimated 250m³)

Note: Exceedances based on January 2015 RBCA Guidelines

Figure 4: Extents of Hydrocarbons in Soil Impacts


SNC • LAVALIN
 1133 TOPSAIL RD.,
 MOUNT PEARL, NL, A1N 5G2
 TEL: (709) 368-0118, FAX: (709) 368-3541

Project: PHASE III ESA
 Location: BUTTER POT PROVINCIAL PARK
 Client: NEWFOUNDLAND AND LABRADOR PARKS AND NATURAL AREAS DIVISION
 Project #: 620891
 Created By: S. HILL Reviewed By: J. GREEN Date: Aug 28, 2015


N

0 5 10 15
 Metres

Map Scale 1:400

APPENDIX B

Photographic Record



Photo 1: View of the storage shed (Left), diesel fuel tank and generator shed.



Photo 2: View of generator shed (Left) and workshop (Right).



Photo 3: View of workshop (Left) and warm-up building (Right).



Photo 4: Low hanging power lines between generator shed and workshop.



Photo 5: Low hanging power lines preventing access to dig test pits.



Photo 6: Boat buried in snow at proposed sampling area.



Photo 7: Trailers and building materials buried in the snow at proposed sampling area.



Photo 8: Monitoring Well MW-1 Installation.



Photo 9: Monitoring Well MW-2 Installation.



Photo 10: Monitoring Well MW-3 Installation.



Photo 11: Monitoring Well MW-4 Installation.

APPENDIX C

Laboratory Certificates

Your P.O. #: 10461
Your Project #: 620891
Site Location: BUTTERPOT PARK
Your C.O.C. #: B 158051

Attention: Jason Green

SNC-Lavalin Inc
1133 Topsail Rd
Mount Pearl, NL
A1N 5G2

Report Date: 2015/06/18
Report #: R3469433
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5B2408

Received: 2015/06/12, 09:05

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
TEH in Water (PIRI)	6	2015/06/12	2015/06/15	ATL SOP 00198	Atl. PIRI v3 m
VPH in Water (PIRI)	4	N/A	2015/06/15	ATL SOP 00200	Atl. PIRI v3 m
VPH in Water (PIRI)	2	N/A	2015/06/16	ATL SOP 00200	Atl. PIRI v3 m
ModTPH (T1) Calc. for Water	6	N/A	2015/06/16	N/A	Atl. PIRI v3 m

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

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

Encryption Key

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

Rob Whelan, Laboratory Manager
Email: RWhelan@maxxam.ca
Phone# (709)754-0203

=====

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

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

RBCA HYDROCARBONS IN WATER (WATER)

Maxxam ID		AKX996	AKX996	AKX998	AKX999	AKY000	AKY001	AKY002		
Sampling Date		2015/06/09	2015/06/09	2015/06/09	2015/06/09	2015/06/09	2015/06/09	2015/06/09		
COC Number		B 158051	B 158051	B 158051	B 158051	B 158051	B 158051	B 158051		
	Units	MW-1	MW-1 Lab-Dup	MW-2	MW-3	MW-4	MW-5	TAP-1	RDL	QC Batch

Petroleum Hydrocarbons										
Benzene	mg/L	ND	ND	ND	ND	ND	ND	ND	0.0010	4066080
Toluene	mg/L	ND	ND	ND	ND	ND	ND	ND	0.0010	4066080
Ethylbenzene	mg/L	ND	ND	ND	ND	ND	ND	ND	0.0010	4066080
Total Xylenes	mg/L	ND	ND	ND	ND	ND	ND	ND	0.0020	4066080
C6 - C10 (less BTEX)	mg/L	ND	ND	ND	ND	ND	ND	ND	0.010	4066080
>C10-C16 Hydrocarbons	mg/L	ND		ND	ND	ND	ND	ND	0.050	4063415
>C16-C21 Hydrocarbons	mg/L	ND		ND	ND	ND	ND	ND	0.050	4063415
>C21-<C32 Hydrocarbons	mg/L	ND		ND	ND	ND	ND	ND	0.10	4063415
Modified TPH (Tier1)	mg/L	ND		ND	ND	ND	ND	ND	0.10	4063120
Reached Baseline at C32	mg/L	Yes		Yes	Yes	Yes	Yes	Yes	N/A	4063415

Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	102		102	112	103	100	103		4063415
n-Dotriacontane - Extractable	%	101 (1)		100 (1)	111 (1)	101 (1)	100 (1)	103		4063415
Isobutylbenzene - Volatile	%	92	99	99	97	85	90	93		4066080

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 Lab-Dup = Laboratory Initiated Duplicate
 ND = Not detected
 N/A = Not Applicable
 (1) TEH sample contained sediment.

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

RBCA HYDROCARBONS IN WATER (WATER)

Maxxam ID		AKY002		
Sampling Date		2015/06/09		
COC Number		B 158051		
	Units	TAP-1 Lab-Dup	RDL	QC Batch
Petroleum Hydrocarbons				
>C10-C16 Hydrocarbons	mg/L	ND	0.050	4063415
>C16-C21 Hydrocarbons	mg/L	ND	0.050	4063415
>C21-<C32 Hydrocarbons	mg/L	ND	0.10	4063415
Reached Baseline at C32	mg/L	Yes	N/A	4063415
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	101		4063415
n-Dotriacontane - Extractable	%	100		4063415
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate ND = Not detected N/A = Not Applicable				

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
4063415	SPI	Matrix Spike	Isobutylbenzene - Extractable	2015/06/15		98	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/15		104	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/15		42 (1)	%	70 - 130
			>C16-C21 Hydrocarbons	2015/06/15		48 (1)	%	70 - 130
			>C21-<C32 Hydrocarbons	2015/06/15		46 (1)	%	70 - 130
4063415	SPI	Spiked Blank	Isobutylbenzene - Extractable	2015/06/15		98	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/15		103	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/15		79	%	70 - 130
			>C16-C21 Hydrocarbons	2015/06/15		89	%	70 - 130
			>C21-<C32 Hydrocarbons	2015/06/15		86	%	70 - 130
4063415	SPI	Method Blank	Isobutylbenzene - Extractable	2015/06/15		99	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/15		101	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/15	ND, RDL=0.050		mg/L	
			>C16-C21 Hydrocarbons	2015/06/15	ND, RDL=0.050		mg/L	
			>C21-<C32 Hydrocarbons	2015/06/15	ND, RDL=0.10		mg/L	
4063415	SPI	RPD [AKY002-01]	>C10-C16 Hydrocarbons	2015/06/15	NC		%	40
			>C16-C21 Hydrocarbons	2015/06/15	NC		%	40
			>C21-<C32 Hydrocarbons	2015/06/15	NC		%	40
4066080	DDE	Matrix Spike [AKX998-01]	Isobutylbenzene - Volatile	2015/06/16		89	%	70 - 130
			Benzene	2015/06/16		95	%	70 - 130
			Toluene	2015/06/16		95	%	70 - 130
			Ethylbenzene	2015/06/16		95	%	70 - 130
			Total Xylenes	2015/06/16		93	%	70 - 130
			Isobutylbenzene - Volatile	2015/06/16		101	%	70 - 130
4066080	DDE	Spiked Blank	Benzene	2015/06/16		100	%	70 - 130
			Toluene	2015/06/16		95	%	70 - 130
			Ethylbenzene	2015/06/16		100	%	70 - 130
			Total Xylenes	2015/06/16		97	%	70 - 130
			Isobutylbenzene - Volatile	2015/06/16		101	%	70 - 130
			Benzene	2015/06/16	ND, RDL=0.0010		mg/L	
4066080	DDE	Method Blank	Toluene	2015/06/16	ND, RDL=0.0010		mg/L	
			Ethylbenzene	2015/06/16	ND, RDL=0.0010		mg/L	
			Total Xylenes	2015/06/16	ND, RDL=0.0020		mg/L	
			C6 - C10 (less BTEX)	2015/06/16	ND, RDL=0.010		mg/L	
			Benzene	2015/06/15	NC		%	40
			Toluene	2015/06/15	NC		%	40
4066080	DDE	RPD [AKX996-01]	Ethylbenzene	2015/06/15	NC		%	40
			Total Xylenes	2015/06/15	NC		%	40

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	Units	QC Limits	
			C6 - C10 (less BTEX)	2015/06/15	NC		%	40	

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

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

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

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

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

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

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

Maxxam Job #: B5B2408
Report Date: 2015/06/18

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

VALIDATION SIGNATURE PAGE

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



Paula Chaplin, Project Manager

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

Your P.O. #: 10461
Your Project #: 620891
Site Location: BUTTERPOT PARK
Your C.O.C. #: B 158051

Attention: Jason Green

SNC-Lavalin Inc
1133 Topsail Rd
Mount Pearl, NL
A1N 5G2

Report Date: 2015/06/22
Report #: R3477148
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5B3907

Received: 2015/06/15, 10:41

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PAH in Water by GC/MS (SIM) (1)	5	2015/06/17	2015/06/19	ATL SOP 00103	EPA 8270D 2007 m

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

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

(1) This test was performed by Maxxam Bedford

Encryption Key

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

Michelle Hill, Project Manager

Email: MHill@maxxam.ca

Phone# (902)420-0203 Ext:289

=====

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

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		ALF981	ALF982	ALF983	ALF984	ALF985		
Sampling Date		2015/06/09	2015/06/09	2015/06/09	2015/06/09	2015/06/09		
COC Number		B 158051	B 158051	B 158051	B 158051	B 158051		
	Units	MW-1	MW-2	MW-3	MW-4	TAP-1	RDL	QC Batch
Polyaromatic Hydrocarbons								
1-Methylnaphthalene	ug/L	ND	ND	ND	ND	ND	0.050	4069058
2-Methylnaphthalene	ug/L	ND	ND	ND	ND	ND	0.050	4069058
Acenaphthene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Acenaphthylene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Anthracene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(a)anthracene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(a)pyrene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(b)fluoranthene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(g,h,i)perylene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(j)fluoranthene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Benzo(k)fluoranthene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Chrysene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Dibenz(a,h)anthracene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Fluoranthene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Fluorene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Indeno(1,2,3-cd)pyrene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Naphthalene	ug/L	ND	ND	ND	ND	ND	0.20	4069058
Perylene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Phenanthrene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Pyrene	ug/L	ND	ND	ND	ND	ND	0.010	4069058
Surrogate Recovery (%)								
D10-Anthracene	%	76	77	68	70	98		4069058
D14-Terphenyl	%	82	76	73	86	102		4069058
D8-Acenaphthylene	%	83	79	75	89	101		4069058
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected								

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

GENERAL COMMENTS

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

Package 1	5.0°C
-----------	-------

Results relate only to the items tested.

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

QUALITY ASSURANCE REPORT

QA/QC			Parameter	Date	Value	Recovery	Units	QC Limits
Batch	Init	QC Type		Analyzed				
4069058	HIN	Matrix Spike [ALF981-01]	D10-Anthracene	2015/06/19		70	%	30 - 130
			D14-Terphenyl	2015/06/19		75	%	30 - 130
			D8-Acenaphthylene	2015/06/19		75	%	30 - 130
			1-Methylnaphthalene	2015/06/19		69	%	30 - 130
			2-Methylnaphthalene	2015/06/19		75	%	30 - 130
			Acenaphthene	2015/06/19		79	%	30 - 130
			Acenaphthylene	2015/06/19		76	%	30 - 130
			Anthracene	2015/06/19		68	%	30 - 130
			Benzo(a)anthracene	2015/06/19		58	%	30 - 130
			Benzo(a)pyrene	2015/06/19		67	%	30 - 130
			Benzo(b)fluoranthene	2015/06/19		74	%	30 - 130
			Benzo(g,h,i)perylene	2015/06/19		63	%	30 - 130
			Benzo(j)fluoranthene	2015/06/19		62	%	30 - 130
			Benzo(k)fluoranthene	2015/06/19		59	%	30 - 130
			Chrysene	2015/06/19		70	%	30 - 130
			Dibenz(a,h)anthracene	2015/06/19		51	%	30 - 130
			Fluoranthene	2015/06/19		71	%	30 - 130
			Fluorene	2015/06/19		76	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/06/19		55	%	30 - 130
			Naphthalene	2015/06/19		77	%	30 - 130
Perylene	2015/06/19		61	%	30 - 130			
Phenanthrene	2015/06/19		75	%	30 - 130			
Pyrene	2015/06/19		69	%	30 - 130			
4069058	HIN	Spiked Blank	D10-Anthracene	2015/06/19		98	%	30 - 130
			D14-Terphenyl	2015/06/19		102	%	30 - 130
			D8-Acenaphthylene	2015/06/19		102	%	30 - 130
			1-Methylnaphthalene	2015/06/19		93	%	30 - 130
			2-Methylnaphthalene	2015/06/19		97	%	30 - 130
			Acenaphthene	2015/06/19		105	%	30 - 130
			Acenaphthylene	2015/06/19		98	%	30 - 130
			Anthracene	2015/06/19		87	%	30 - 130
			Benzo(a)anthracene	2015/06/19		77	%	30 - 130
			Benzo(a)pyrene	2015/06/19		73	%	30 - 130
			Benzo(b)fluoranthene	2015/06/19		80	%	30 - 130
			Benzo(g,h,i)perylene	2015/06/19		76	%	30 - 130
			Benzo(j)fluoranthene	2015/06/19		78	%	30 - 130
			Benzo(k)fluoranthene	2015/06/19		65	%	30 - 130
			Chrysene	2015/06/19		87	%	30 - 130
			Dibenz(a,h)anthracene	2015/06/19		61	%	30 - 130
			Fluoranthene	2015/06/19		95	%	30 - 130
			Fluorene	2015/06/19		101	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/06/19		72	%	30 - 130
			Naphthalene	2015/06/19		105	%	30 - 130
Perylene	2015/06/19		73	%	30 - 130			
Phenanthrene	2015/06/19		99	%	30 - 130			
Pyrene	2015/06/19		91	%	30 - 130			
4069058	HIN	Method Blank	D10-Anthracene	2015/06/19		87	%	30 - 130
			D14-Terphenyl	2015/06/19		103	%	30 - 130
			D8-Acenaphthylene	2015/06/19		98	%	30 - 130
			1-Methylnaphthalene	2015/06/19		ND, RDL=0.050		ug/L

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			2-Methylnaphthalene	2015/06/19	ND, RDL=0.050		ug/L	
			Acenaphthene	2015/06/19	ND, RDL=0.010		ug/L	
			Acenaphthylene	2015/06/19	ND, RDL=0.010		ug/L	
			Anthracene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(a)anthracene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(a)pyrene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(b)fluoranthene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(g,h,i)perylene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(j)fluoranthene	2015/06/19	ND, RDL=0.010		ug/L	
			Benzo(k)fluoranthene	2015/06/19	ND, RDL=0.010		ug/L	
			Chrysene	2015/06/19	ND, RDL=0.010		ug/L	
			Dibenz(a,h)anthracene	2015/06/19	ND, RDL=0.010		ug/L	
			Fluoranthene	2015/06/19	ND, RDL=0.010		ug/L	
			Fluorene	2015/06/19	ND, RDL=0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2015/06/19	ND, RDL=0.010		ug/L	
			Naphthalene	2015/06/19	ND, RDL=0.20		ug/L	
			Perylene	2015/06/19	ND, RDL=0.010		ug/L	
			Phenanthrene	2015/06/19	ND, RDL=0.010		ug/L	
			Pyrene	2015/06/19	ND, RDL=0.010		ug/L	
4069058	HIN	RPD	1-Methylnaphthalene	2015/06/19	NC		%	40
			2-Methylnaphthalene	2015/06/19	NC		%	40
			Acenaphthene	2015/06/19	NC		%	40
			Acenaphthylene	2015/06/19	NC		%	40
			Anthracene	2015/06/19	NC		%	40
			Benzo(a)anthracene	2015/06/19	NC		%	40
			Benzo(a)pyrene	2015/06/19	NC		%	40
			Benzo(b)fluoranthene	2015/06/19	NC		%	40
			Benzo(g,h,i)perylene	2015/06/19	NC		%	40
			Benzo(j)fluoranthene	2015/06/19	NC		%	40
			Benzo(k)fluoranthene	2015/06/19	NC		%	40

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	Units	QC Limits	
			Chrysene	2015/06/19	NC		%	40	
			Dibenz(a,h)anthracene	2015/06/19	NC		%	40	
			Fluoranthene	2015/06/19	NC		%	40	
			Fluorene	2015/06/19	NC		%	40	
			Indeno(1,2,3-cd)pyrene	2015/06/19	NC		%	40	
			Naphthalene	2015/06/19	NC		%	40	
			Perylene	2015/06/19	NC		%	40	
			Phenanthrene	2015/06/19	NC		%	40	
			Pyrene	2015/06/19	NC		%	40	

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

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

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

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

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

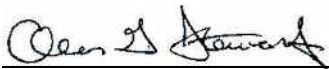
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Job #: B5B3907
Report Date: 2015/06/22

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10461
Sampler Initials: JG

VALIDATION SIGNATURE PAGE

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



Alan Stewart, Scientific Specialist (Organics)

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

Your Project #: 620891
 Site Location: BUTTERPOT PARK
 Your C.O.C. #: B 158048

Attention: Jason Green

SNC-Lavalin Inc
 1133 Topsail Rd
 Mount Pearl, NL
 A1N 5G2

Report Date: 2015/06/09
 Report #: R3459391
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5A2943

Received: 2015/06/01, 14:00

Sample Matrix: Soil
 # Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
TEH in Soil (PIRI) (1, 2)	3	2015/06/03	2015/06/05	ATL SOP-00197	Atl. PIRI v3 m
TEH in Soil (PIRI) (2)	1	2015/06/03	2015/06/08	ATL SOP-00197	Atl. PIRI v3 m
Moisture	4	N/A	2015/06/03	ATL SOP-00196	OMOE Handbook 1983 m
VPH in Soil (PIRI)	4	2015/06/04	2015/06/05	ATL SOP 00199	Atl. PIRI v3 m
ModTPH (T1) Calc. for Soil	3	N/A	2015/06/05	N/A	Atl. PIRI v3 m
ModTPH (T1) Calc. for Soil	1	N/A	2015/06/08	N/A	Atl. PIRI v3 m

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

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

- (1) Reported on a dry weight basis.
- (2) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

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

Rob Whelan, Laboratory Manager
 Email: RWhelan@maxxam.ca
 Phone# (709)754-0203

=====

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

Maxxam Job #: B5A2943
Report Date: 2015/06/09

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

RBCA HYDROCARBONS IN SOIL (SOIL)

Maxxam ID		AJG222	AJG223	AJG224	AJG225		
Sampling Date		2015/05/27	2015/05/27	2015/05/27	2015/05/27		
COC Number		B 158048	B 158048	B 158048	B 158048		
	Units	TP7 (Surface)	TP7 (1.9m)	TP6 (Surface)	TP6 (1.5m)	RDL	QC Batch
Inorganics							
Moisture	%	35	9.5	32	9.4	1.0	4046950
Petroleum Hydrocarbons							
Benzene	mg/kg	ND	ND	ND	ND	0.025	4051728
Toluene	mg/kg	ND	ND	ND	ND	0.025	4051728
Ethylbenzene	mg/kg	ND	ND	ND	ND	0.025	4051728
Total Xylenes	mg/kg	ND	ND	ND	ND	0.050	4051728
C6 - C10 (less BTEX)	mg/kg	ND	ND	ND	ND	2.5	4051728
>C10-C16 Hydrocarbons	mg/kg	ND	ND	ND	ND	10	4051818
>C16-C21 Hydrocarbons	mg/kg	ND	ND	ND	ND	10	4051818
>C21-<C32 Hydrocarbons	mg/kg	71	ND	31	ND	15	4051818
Modified TPH (Tier1)	mg/kg	71	ND	31	ND	15	4046363
Reached Baseline at C32	mg/kg	No	Yes	No	Yes	N/A	4051818
Hydrocarbon Resemblance	mg/kg	COMMENT (1)		COMMENT (1)		N/A	4051818
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	96	97	100	100		4051818
n-Dotriacontane - Extractable	%	102	95	100	98		4051818
Isobutylbenzene - Volatile	%	119	99	115	102		4051728
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected N/A = Not Applicable (1) No resemblance to petroleum products in lube oil range.							

Maxxam Job #: B5A2943
Report Date: 2015/06/09

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B5A2943
Report Date: 2015/06/09

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
4046950	MRC	RPD	Moisture	2015/06/03	11		%	25
4051728	MCT	Spiked Blank	Isobutylbenzene - Volatile	2015/06/05		99	%	60 - 130
			Benzene	2015/06/05		95	%	60 - 140
			Toluene	2015/06/05		94	%	60 - 140
			Ethylbenzene	2015/06/05		98	%	60 - 140
			Total Xylenes	2015/06/05		101	%	60 - 140
4051728	MCT	Method Blank	Isobutylbenzene - Volatile	2015/06/05		96	%	60 - 130
			Benzene	2015/06/05	ND, RDL=0.025		mg/kg	
			Toluene	2015/06/05	ND, RDL=0.025		mg/kg	
			Ethylbenzene	2015/06/05	ND, RDL=0.025		mg/kg	
			Total Xylenes	2015/06/05	ND, RDL=0.050		mg/kg	
			C6 - C10 (less BTEX)	2015/06/05	ND, RDL=2.5		mg/kg	
4051728	MCT	RPD	Benzene	2015/06/05	NC		%	50
			Toluene	2015/06/05	NC		%	50
			Ethylbenzene	2015/06/05	NC		%	50
			Total Xylenes	2015/06/05	NC		%	50
			C6 - C10 (less BTEX)	2015/06/05	NC		%	50
4051818	SPI	Matrix Spike	Isobutylbenzene - Extractable	2015/06/05		95	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/05		104	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/05		100	%	30 - 130
			>C16-C21 Hydrocarbons	2015/06/05		105	%	30 - 130
			>C21-<C32 Hydrocarbons	2015/06/05		NC	%	30 - 130
4051818	SPI	Spiked Blank	Isobutylbenzene - Extractable	2015/06/05		99	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/05		105	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/05		104	%	30 - 130
			>C16-C21 Hydrocarbons	2015/06/05		109	%	30 - 130
			>C21-<C32 Hydrocarbons	2015/06/05		112	%	30 - 130
4051818	SPI	Method Blank	Isobutylbenzene - Extractable	2015/06/05		99	%	30 - 130
			n-Dotriacontane - Extractable	2015/06/05		100	%	30 - 130
			>C10-C16 Hydrocarbons	2015/06/05	ND, RDL=10		mg/kg	
			>C16-C21 Hydrocarbons	2015/06/05	ND, RDL=10		mg/kg	
			>C21-<C32 Hydrocarbons	2015/06/05	ND, RDL=15		mg/kg	
4051818	SPI	RPD	>C10-C16 Hydrocarbons	2015/06/05	NC		%	50
			>C16-C21 Hydrocarbons	2015/06/05	42		%	50

Maxxam Job #: B5A2943
Report Date: 2015/06/09

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	Units	QC Limits	
			>C21-<C32 Hydrocarbons	2015/06/05	53 (1)		%	50	
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p>									

Maxxam Job #: B5A2943
Report Date: 2015/06/09

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

VALIDATION SIGNATURE PAGE

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



Paula Chaplin, Project Manager

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

Your P.O. #: 10400
Your Project #: 620891
Site Location: BUTTERPOT PARK
Your C.O.C. #: B 158139, B 158091

Attention:Jonathan Brazil

SNC-Lavalin Inc
1133 Topsail Rd
Mount Pearl, NL
A1N 5G2

Report Date: 2015/06/25
Report #: R3493250
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B514130

Received: 2015/01/26, 08:00

Sample Matrix: Soil
Samples Received: 11

Analyses	Date		Laboratory Method	Reference
	Quantity Extracted	Date Analyzed		
Moisture	11	N/A	2015/01/28 ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	11	2015/01/28	2015/01/29 ATL SOP 00102	EPA 8270D 2007 m

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

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

Michelle Hill, Project Manager

Email: MHill@maxxam.ca

Phone# (902)420-0203 Ext:289

=====

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

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

RESULTS OF ANALYSES OF SOIL

Maxxam ID		ZH1237	ZH1238	ZH1239	ZH1240		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 1 (SURFACE)	TEST PIT 1 (BOTTOM)	TEST PIT 2 (SURFACE)	TEST PIT 2 (BOTTOM)	RDL	QC Batch

Inorganics							
Moisture	%	10	9.8	27	9.4	1.0	3898178
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Maxxam ID		ZH1241	ZH1242	ZH1243	ZH1244		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 3 (SURFACE)	TEST PIT 3 (BOTTOM)	TEST PIT 4 (SURFACE)	TEST PIT 4 (BOTTOM)	RDL	QC Batch

Inorganics							
Moisture	%	33	15	32	12	1.0	3898178
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							

Maxxam ID		ZH1245	ZH1246	ZH1247		
Sampling Date		2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158091		
	Units	TEST PIT 5 (SURFACE)	TEST PIT 5 (BOTTOM)	TEST PIT 10 (SURFACE)	RDL	QC Batch

Inorganics						
Moisture	%	35	23	9.3	1.0	3898178
RDL = Reportable Detection Limit QC Batch = Quality Control Batch						

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		ZH1237	ZH1238	ZH1239	ZH1240		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 1 (SURFACE)	TEST PIT 1 (BOTTOM)	TEST PIT 2 (SURFACE)	TEST PIT 2 (BOTTOM)	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(b)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(j)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Chrysene	mg/kg	ND	ND	ND	ND	0.010	3900360
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluorene	mg/kg	ND	ND	ND	ND	0.010	3900360
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Naphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Phenanthrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Pyrene	mg/kg	ND	0.019	ND	ND	0.010	3900360
Surrogate Recovery (%)							
D10-Anthracene	%	105	99	93	103		3900360
D14-Terphenyl (FS)	%	115	103	82	107		3900360
D8-Acenaphthylene	%	101	93	90	96		3900360
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected							

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		ZH1241	ZH1242	ZH1243	ZH1243		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 3 (SURFACE)	TEST PIT 3 (BOTTOM)	TEST PIT 4 (SURFACE)	TEST PIT 4 (SURFACE) Lab-Dup	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(b)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(j)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Chrysene	mg/kg	ND	ND	ND	ND	0.010	3900360
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluorene	mg/kg	ND	ND	ND	ND	0.010	3900360
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Naphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Phenanthrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Surrogate Recovery (%)							
D10-Anthracene	%	100	91	112	106		3900360
D14-Terphenyl (FS)	%	116	101	120	110		3900360
D8-Acenaphthylene	%	105	89	108	103		3900360
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate ND = Not detected							

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		ZH1244	ZH1245	ZH1246	ZH1247		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158091		
	Units	TEST PIT 4 (BOTTOM)	TEST PIT 5 (SURFACE)	TEST PIT 5 (BOTTOM)	TEST PIT 10 (SURFACE)	RDL	QC Batch

Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Acenaphthylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(b)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(j)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Chrysene	mg/kg	ND	ND	ND	ND	0.010	3900360
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluoranthene	mg/kg	ND	ND	ND	ND	0.010	3900360
Fluorene	mg/kg	ND	ND	ND	ND	0.010	3900360
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Naphthalene	mg/kg	ND	ND	ND	ND	0.010	3900360
Perylene	mg/kg	ND	ND	ND	ND	0.010	3900360
Phenanthrene	mg/kg	ND	ND	ND	ND	0.010	3900360
Pyrene	mg/kg	ND	ND	ND	ND	0.010	3900360

Surrogate Recovery (%)							
D10-Anthracene	%	90	96	96	101		3900360
D14-Terphenyl (FS)	%	101	111	107	116		3900360
D8-Acenaphthylene	%	85	92	94	101		3900360

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

GENERAL COMMENTS

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

Package 1	6.0°C
-----------	-------

Revised report - Changed sample ID for ZH1247 from TEST PIT 6 (SURFACE) to TEST PIT 10 (SURFACE) as per J. Green 2015/06/25

Results relate only to the items tested.

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

QUALITY ASSURANCE REPORT

QA/QC			Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
Batch	Init	QC Type						
3900360	KBT	Matrix Spike [ZH1243-01]	D10-Anthracene	2015/01/29		99	%	30 - 130
			D14-Terphenyl (FS)	2015/01/29		112	%	30 - 130
			D8-Acenaphthylene	2015/01/29		93	%	30 - 130
			1-Methylnaphthalene	2015/01/29		91	%	30 - 130
			2-Methylnaphthalene	2015/01/29		99	%	30 - 130
			Acenaphthene	2015/01/29		86	%	30 - 130
			Acenaphthylene	2015/01/29		111	%	30 - 130
			Anthracene	2015/01/29		99	%	30 - 130
			Benzo(a)anthracene	2015/01/29		84	%	30 - 130
			Benzo(a)pyrene	2015/01/29		94	%	30 - 130
			Benzo(b)fluoranthene	2015/01/29		100	%	30 - 130
			Benzo(g,h,i)perylene	2015/01/29		87	%	30 - 130
			Benzo(j)fluoranthene	2015/01/29		91	%	30 - 130
			Benzo(k)fluoranthene	2015/01/29		88	%	30 - 130
			Chrysene	2015/01/29		91	%	30 - 130
			Dibenz(a,h)anthracene	2015/01/29		88	%	30 - 130
			Fluoranthene	2015/01/29		89	%	30 - 130
			Fluorene	2015/01/29		98	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/01/29		90	%	30 - 130
			Naphthalene	2015/01/29		85	%	30 - 130
Perylene	2015/01/29		87	%	30 - 130			
Phenanthrene	2015/01/29		92	%	30 - 130			
Pyrene	2015/01/29		89	%	30 - 130			
3900360	KBT	Spiked Blank	D10-Anthracene	2015/01/29		95	%	30 - 130
			D14-Terphenyl (FS)	2015/01/29		112	%	30 - 130
			D8-Acenaphthylene	2015/01/29		87	%	30 - 130
			1-Methylnaphthalene	2015/01/29		83	%	30 - 130
			2-Methylnaphthalene	2015/01/29		90	%	30 - 130
			Acenaphthene	2015/01/29		79	%	30 - 130
			Acenaphthylene	2015/01/29		102	%	30 - 130
			Anthracene	2015/01/29		96	%	30 - 130
			Benzo(a)anthracene	2015/01/29		79	%	30 - 130
			Benzo(a)pyrene	2015/01/29		95	%	30 - 130
			Benzo(b)fluoranthene	2015/01/29		91	%	30 - 130
			Benzo(g,h,i)perylene	2015/01/29		91	%	30 - 130
			Benzo(j)fluoranthene	2015/01/29		91	%	30 - 130
			Benzo(k)fluoranthene	2015/01/29		97	%	30 - 130
			Chrysene	2015/01/29		87	%	30 - 130
			Dibenz(a,h)anthracene	2015/01/29		88	%	30 - 130
			Fluoranthene	2015/01/29		90	%	30 - 130
			Fluorene	2015/01/29		91	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/01/29		91	%	30 - 130
			Naphthalene	2015/01/29		78	%	30 - 130
Perylene	2015/01/29		89	%	30 - 130			
Phenanthrene	2015/01/29		89	%	30 - 130			
Pyrene	2015/01/29		88	%	30 - 130			
3900360	KBT	Method Blank	D10-Anthracene	2015/01/29		95	%	30 - 130
			D14-Terphenyl (FS)	2015/01/29		108	%	30 - 130
			D8-Acenaphthylene	2015/01/29		90	%	30 - 130
			1-Methylnaphthalene	2015/01/29	ND, RDL=0.010		mg/kg	

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			2-Methylnaphthalene	2015/01/29	ND, RDL=0.010		mg/kg	
			Acenaphthene	2015/01/29	ND, RDL=0.010		mg/kg	
			Acenaphthylene	2015/01/29	ND, RDL=0.010		mg/kg	
			Anthracene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(a)anthracene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(a)pyrene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(b)fluoranthene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(g,h,i)perylene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(j)fluoranthene	2015/01/29	ND, RDL=0.010		mg/kg	
			Benzo(k)fluoranthene	2015/01/29	ND, RDL=0.010		mg/kg	
			Chrysene	2015/01/29	ND, RDL=0.010		mg/kg	
			Dibenz(a,h)anthracene	2015/01/29	ND, RDL=0.010		mg/kg	
			Fluoranthene	2015/01/29	ND, RDL=0.010		mg/kg	
			Fluorene	2015/01/29	ND, RDL=0.010		mg/kg	
			Indeno(1,2,3-cd)pyrene	2015/01/29	ND, RDL=0.010		mg/kg	
			Naphthalene	2015/01/29	ND, RDL=0.010		mg/kg	
			Perylene	2015/01/29	ND, RDL=0.010		mg/kg	
			Phenanthrene	2015/01/29	ND, RDL=0.010		mg/kg	
			Pyrene	2015/01/29	ND, RDL=0.010		mg/kg	
3900360	KBT	RPD [ZH1243-01]	1-Methylnaphthalene	2015/01/29	NC		%	50
			2-Methylnaphthalene	2015/01/29	NC		%	50
			Acenaphthene	2015/01/29	NC		%	50
			Acenaphthylene	2015/01/29	NC		%	50
			Anthracene	2015/01/29	NC		%	50
			Benzo(a)anthracene	2015/01/29	NC		%	50
			Benzo(a)pyrene	2015/01/29	NC		%	50
			Benzo(b)fluoranthene	2015/01/29	NC		%	50
			Benzo(g,h,i)perylene	2015/01/29	NC		%	50
			Benzo(j)fluoranthene	2015/01/29	NC		%	50
			Benzo(k)fluoranthene	2015/01/29	NC		%	50

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	Units	QC Limits	
			Chrysene	2015/01/29	NC		%	50	
			Dibenz(a,h)anthracene	2015/01/29	NC		%	50	
			Fluoranthene	2015/01/29	NC		%	50	
			Fluorene	2015/01/29	NC		%	50	
			Indeno(1,2,3-cd)pyrene	2015/01/29	NC		%	50	
			Naphthalene	2015/01/29	NC		%	50	
			Perylene	2015/01/29	NC		%	50	
			Phenanthrene	2015/01/29	NC		%	50	
			Pyrene	2015/01/29	NC		%	50	

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

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

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

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

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

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

Maxxam Job #: B514130
Report Date: 2015/06/25

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

VALIDATION SIGNATURE PAGE

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



Rose MacDonald, Scientific Specialist (Organics)

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

Your Project #: 620891
Site Location: BUTTERPOT PARK
Your C.O.C. #: B 158048

Attention: Jason Green

SNC-Lavalin Inc
1133 Topsail Rd
Mount Pearl, NL
A1N 5G2

Report Date: 2015/06/10
Report #: R3460226
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5A4843

Received: 2015/06/03, 10:43

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
Moisture (1)	4	N/A	2015/06/04	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1, 2)	4	2015/06/05	2015/06/08	ATL SOP 00102	EPA 8270D 2007 m

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

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

(1) This test was performed by Maxxam Bedford

(2) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

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

Michelle Hill, Project Manager

Email: MHill@maxxam.ca

Phone# (902)420-0203 Ext:289

=====

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

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AJO860		AJO861	AJO862	AJO863		
Sampling Date		2015/05/27		2015/05/27	2015/05/27	2015/05/27		
COC Number		B 158048		B 158048	B 158048	B 158048		
	Units	TP7 (SURFACE)	QC Batch	TP7 (1.9M)	TP6 (SURFACE)	TP6 (1.5M)	RDL	QC Batch
Inorganics								
Moisture	%	38	4049054	11	25	5.0	1.0	4049002
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		AJO860	AJO861	AJO862	AJO863		
Sampling Date		2015/05/27	2015/05/27	2015/05/27	2015/05/27		
COC Number		B 158048	B 158048	B 158048	B 158048		
	Units	TP7 (SURFACE)	TP7 (1.9M)	TP6 (SURFACE)	TP6 (1.5M)	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	4052867
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	0.010	4052867
Acenaphthene	mg/kg	ND	ND	ND	ND	0.010	4052867
Acenaphthylene	mg/kg	ND	ND	ND	ND	0.010	4052867
Anthracene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(b)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(j)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	4052867
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	0.010	4052867
Chrysene	mg/kg	ND	ND	ND	ND	0.010	4052867
Dibenz(a,h)anthracene	mg/kg	ND	ND	ND	ND	0.010	4052867
Fluoranthene	mg/kg	ND	ND	ND	ND	0.010	4052867
Fluorene	mg/kg	ND	ND	ND	ND	0.010	4052867
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	0.010	4052867
Naphthalene	mg/kg	ND	ND	ND	ND	0.010	4052867
Perylene	mg/kg	ND	ND	ND	ND	0.010	4052867
Phenanthrene	mg/kg	ND	ND	ND	ND	0.010	4052867
Pyrene	mg/kg	ND	ND	ND	ND	0.010	4052867
Surrogate Recovery (%)							
D10-Anthracene	%	97	101	106	104		4052867
D14-Terphenyl (FS)	%	94	97	96	96		4052867
D8-Acenaphthylene	%	103	104	102	109		4052867
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected							

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

GENERAL COMMENTS

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

Package 1	3.5°C
-----------	-------

Results relate only to the items tested.

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
4052867	HIN	Matrix Spike	D10-Anthracene	2015/06/08		108	%	30 - 130
			D14-Terphenyl (FS)	2015/06/08		101	%	30 - 130
			D8-Acenaphthylene	2015/06/08		108	%	30 - 130
			1-Methylnaphthalene	2015/06/08		91	%	30 - 130
			2-Methylnaphthalene	2015/06/08		95	%	30 - 130
			Acenaphthene	2015/06/08		92	%	30 - 130
			Acenaphthylene	2015/06/08		90	%	30 - 130
			Anthracene	2015/06/08		88	%	30 - 130
			Benzo(a)anthracene	2015/06/08		87	%	30 - 130
			Benzo(a)pyrene	2015/06/08		102	%	30 - 130
			Benzo(b)fluoranthene	2015/06/08		100	%	30 - 130
			Benzo(g,h,i)perylene	2015/06/08		96	%	30 - 130
			Benzo(j)fluoranthene	2015/06/08		99	%	30 - 130
			Benzo(k)fluoranthene	2015/06/08		101	%	30 - 130
			Chrysene	2015/06/08		81	%	30 - 130
			Dibenz(a,h)anthracene	2015/06/08		112	%	30 - 130
			Fluoranthene	2015/06/08		84	%	30 - 130
			Fluorene	2015/06/08		95	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/06/08		101	%	30 - 130
			Naphthalene	2015/06/08		90	%	30 - 130
Perylene	2015/06/08		97	%	30 - 130			
Phenanthrene	2015/06/08		84	%	30 - 130			
Pyrene	2015/06/08		86	%	30 - 130			
4052867	HIN	Spiked Blank	D10-Anthracene	2015/06/08		109	%	30 - 130
			D14-Terphenyl (FS)	2015/06/08		96	%	30 - 130
			D8-Acenaphthylene	2015/06/08		101	%	30 - 130
			1-Methylnaphthalene	2015/06/08		88	%	30 - 130
			2-Methylnaphthalene	2015/06/08		91	%	30 - 130
			Acenaphthene	2015/06/08		88	%	30 - 130
			Acenaphthylene	2015/06/08		85	%	30 - 130
			Anthracene	2015/06/08		90	%	30 - 130
			Benzo(a)anthracene	2015/06/08		86	%	30 - 130
			Benzo(a)pyrene	2015/06/08		100	%	30 - 130
			Benzo(b)fluoranthene	2015/06/08		106	%	30 - 130
			Benzo(g,h,i)perylene	2015/06/08		97	%	30 - 130
			Benzo(j)fluoranthene	2015/06/08		97	%	30 - 130
			Benzo(k)fluoranthene	2015/06/08		94	%	30 - 130
			Chrysene	2015/06/08		81	%	30 - 130
			Dibenz(a,h)anthracene	2015/06/08		103	%	30 - 130
			Fluoranthene	2015/06/08		78	%	30 - 130
			Fluorene	2015/06/08		89	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/06/08		96	%	30 - 130
			Naphthalene	2015/06/08		84	%	30 - 130
Perylene	2015/06/08		99	%	30 - 130			
Phenanthrene	2015/06/08		87	%	30 - 130			
Pyrene	2015/06/08		81	%	30 - 130			
4052867	HIN	Method Blank	D10-Anthracene	2015/06/08		103	%	30 - 130
			D14-Terphenyl (FS)	2015/06/08		103	%	30 - 130
			D8-Acenaphthylene	2015/06/08		104	%	30 - 130
			1-Methylnaphthalene	2015/06/08		ND, RDL=0.010		mg/kg

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			2-Methylnaphthalene	2015/06/08	ND, RDL=0.010		mg/kg	
			Acenaphthene	2015/06/08	ND, RDL=0.010		mg/kg	
			Acenaphthylene	2015/06/08	ND, RDL=0.010		mg/kg	
			Anthracene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(a)anthracene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(a)pyrene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(b)fluoranthene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(g,h,i)perylene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(j)fluoranthene	2015/06/08	ND, RDL=0.010		mg/kg	
			Benzo(k)fluoranthene	2015/06/08	ND, RDL=0.010		mg/kg	
			Chrysene	2015/06/08	ND, RDL=0.010		mg/kg	
			Dibenz(a,h)anthracene	2015/06/08	ND, RDL=0.010		mg/kg	
			Fluoranthene	2015/06/08	ND, RDL=0.010		mg/kg	
			Fluorene	2015/06/08	ND, RDL=0.010		mg/kg	
			Indeno(1,2,3-cd)pyrene	2015/06/08	ND, RDL=0.010		mg/kg	
			Naphthalene	2015/06/08	ND, RDL=0.010		mg/kg	
			Perylene	2015/06/08	ND, RDL=0.010		mg/kg	
			Phenanthrene	2015/06/08	ND, RDL=0.010		mg/kg	
			Pyrene	2015/06/08	ND, RDL=0.010		mg/kg	
4052867	HIN	RPD	1-Methylnaphthalene	2015/06/08	NC		%	50
			2-Methylnaphthalene	2015/06/08	NC		%	50
			Acenaphthene	2015/06/08	NC		%	50
			Acenaphthylene	2015/06/08	NC		%	50
			Anthracene	2015/06/08	NC		%	50
			Benzo(a)anthracene	2015/06/08	NC		%	50
			Benzo(a)pyrene	2015/06/08	NC		%	50
			Benzo(b)fluoranthene	2015/06/08	NC		%	50
			Benzo(g,h,i)perylene	2015/06/08	NC		%	50
			Benzo(j)fluoranthene	2015/06/08	NC		%	50
			Benzo(k)fluoranthene	2015/06/08	NC		%	50
			Chrysene	2015/06/08	NC		%	50

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
			Dibenz(a,h)anthracene	2015/06/08	NC		%	50
			Fluoranthene	2015/06/08	NC		%	50
			Fluorene	2015/06/08	NC		%	50
			Indeno(1,2,3-cd)pyrene	2015/06/08	NC		%	50
			Naphthalene	2015/06/08	NC		%	50
			Perylene	2015/06/08	NC		%	50
			Phenanthrene	2015/06/08	NC		%	50
			Pyrene	2015/06/08	NC		%	50

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

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

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

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

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

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

Maxxam Job #: B5A4843
Report Date: 2015/06/10

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Sampler Initials: JG

VALIDATION SIGNATURE PAGE

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



Rose MacDonald, Scientific Specialist (Organics)

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

Your P.O. #: 10400
Your Project #: 620891
Site Location: BUTTERPOT PARK
Your C.O.C. #: B 158139

Attention:Jonathon Brazil

SNC-Lavalin Inc
1133 Topsail Rd
Mount Pearl, NL
A1N 5G2

Report Date:
Report #: R3535926
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B511943

Received: 2015/01/21, 17:05

Sample Matrix: Soil
Samples Received: 11

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
TEH in Soil (PIRI) (1, 3)	11	2015/01/23	2015/01/26	ATL SOP-00197	Atl. PIRI v3 m
Moisture (2)	11	N/A	2015/01/26	ATL SOP-00196	OMOE Handbook 1983 m
VPH in Soil (PIRI)	11	2015/01/23	2015/01/26	ATL SOP 00199	Atl. PIRI v3 m
ModTPH (T1) Calc. for Soil (2)	11	N/A	2015/01/26	N/A	Atl. PIRI v3 m

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

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

- (1) Reported on a dry weight basis.
- (2) This test was performed by Maxxam St. John's NFLD
- (3) Soils are reported on a dry weight basis unless otherwise specified.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Rob Whelan, Laboratory Manager
Email: RWhelan@maxxam.ca
Phone# (709)754-0203

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

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

RBCA HYDROCARBONS IN SOIL (SOIL)

Maxxam ID		ZG1087	ZG1087	ZG1088	ZG1088		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 1 (SURFACE)	TEST PIT 1 (SURFACE) Lab-Dup	TEST PIT 1 (BOTTOM)	TEST PIT 1 (BOTTOM) Lab-Dup	RDL	QC Batch

Inorganics							
Moisture	%	16	16	9.3		1.0	3895897
Petroleum Hydrocarbons							
Benzene	mg/kg	ND		ND	ND	0.025	3896466
Toluene	mg/kg	ND		ND	ND	0.025	3896466
Ethylbenzene	mg/kg	ND		ND	ND	0.025	3896466
Total Xylenes	mg/kg	ND		ND	ND	0.050	3896466
C6 - C10 (less BTEX)	mg/kg	ND		3.3	ND	2.5	3896466
>C10-C16 Hydrocarbons	mg/kg	ND		350	270	10	3896406
>C16-C21 Hydrocarbons	mg/kg	ND		220	180	10	3896406
>C21-<C32 Hydrocarbons	mg/kg	ND		60	48	15	3896406
Modified TPH (Tier1)	mg/kg	ND		640		15	3894264
Reached Baseline at C32	mg/kg	Yes		Yes	Yes	N/A	3896406
Hydrocarbon Resemblance	mg/kg			COMMENT (1)		N/A	3896406
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	101		106	105		3896406
n-Dotriacontane - Extractable	%	103		109	107		3896406
Isobutylbenzene - Volatile	%	91		139	107		3896466

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 Lab-Dup = Laboratory Initiated Duplicate
 ND = Not detected
 N/A = Not Applicable
 (1) Weathered fuel oil fraction.

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

RBCA HYDROCARBONS IN SOIL (SOIL)

Maxxam ID		ZG1089	ZG1090	ZG1091	ZG1092		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 2 (SURFACE)	TEST PIT 2 (BOTTOM)	TEST PIT 3 (SURFACE)	TEST PIT 3 (BOTTOM)	RDL	QC Batch

Inorganics							
Moisture	%	25	11	29	16	1.0	3895897
Petroleum Hydrocarbons							
Benzene	mg/kg	ND	ND	ND	ND	0.025	3896466
Toluene	mg/kg	ND	ND	ND	ND	0.025	3896466
Ethylbenzene	mg/kg	ND	ND	ND	ND	0.025	3896466
Total Xylenes	mg/kg	ND	ND	ND	ND	0.050	3896466
C6 - C10 (less BTEX)	mg/kg	ND	ND	ND	ND	2.5	3896466
>C10-C16 Hydrocarbons	mg/kg	570	120	ND	ND	10	3896406
>C16-C21 Hydrocarbons	mg/kg	640	160	ND	ND	10	3896406
>C21-<C32 Hydrocarbons	mg/kg	270	86	64	ND	15	3896406
Modified TPH (Tier1)	mg/kg	1500	370	64	ND	15	3894264
Reached Baseline at C32	mg/kg	Yes	Yes	Yes	Yes	N/A	3896406
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (2)	COMMENT (3)		N/A	3896406
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	106	102	102	104		3896406
n-Dotriacontane - Extractable	%	113	109	107	106		3896406
Isobutylbenzene - Volatile	%	120	117	82	93		3896466

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not detected
 N/A = Not Applicable
 (1) Weathered fuel oil fraction.
 (2) Weathered fuel oil fraction. Lube oil range.
 (3) No resemblance to petroleum products in lube oil range.

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

RBCA HYDROCARBONS IN SOIL (SOIL)

Maxxam ID		ZG1093	ZG1094	ZG1095	ZG1096		
Sampling Date		2015/01/19	2015/01/19	2015/01/19	2015/01/19		
COC Number		B 158139	B 158139	B 158139	B 158139		
	Units	TEST PIT 4 (SURFACE)	TEST PIT 4 (BOTTOM)	TEST PIT 5 (SURFACE)	TEST PIT 5 (BOTTOM)	RDL	QC Batch
Inorganics							
Moisture	%	25	11	32	15	1.0	3895897
Petroleum Hydrocarbons							
Benzene	mg/kg	ND	ND	ND	ND	0.025	3896466
Toluene	mg/kg	ND	ND	ND	ND	0.025	3896466
Ethylbenzene	mg/kg	ND	ND	ND	ND	0.025	3896466
Total Xylenes	mg/kg	ND	ND	ND	ND	0.050	3896466
C6 - C10 (less BTEX)	mg/kg	ND	ND	ND	ND	2.5	3896466
>C10-C16 Hydrocarbons	mg/kg	ND	ND	ND	ND	10	3896406
>C16-C21 Hydrocarbons	mg/kg	27	ND	17	ND	10	3896406
>C21-<C32 Hydrocarbons	mg/kg	36	ND	53	ND	15	3896406
Modified TPH (Tier1)	mg/kg	63	ND	70	ND	15	3894264
Reached Baseline at C32	mg/kg	Yes	Yes	Yes	Yes	N/A	3896406
Hydrocarbon Resemblance	mg/kg	COMMENT (1)		COMMENT (1)		N/A	3896406
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	101	104	101	103		3896406
n-Dotriacontane - Extractable	%	105	103	105	105		3896406
Isobutylbenzene - Volatile	%	86	107	84	80		3896466
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected N/A = Not Applicable (1) One product in fuel/lube oil range.							

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

RBCA HYDROCARBONS IN SOIL (SOIL)

Maxxam ID		ZG1097		
Sampling Date		2015/01/19		
COC Number		B 158139		
	Units	TEST PIT 10 (SURFACE)	RDL	QC Batch
Inorganics				
Moisture	%	14	1.0	3895897
Petroleum Hydrocarbons				
Benzene	mg/kg	ND	0.025	3896466
Toluene	mg/kg	ND	0.025	3896466
Ethylbenzene	mg/kg	ND	0.025	3896466
Total Xylenes	mg/kg	ND	0.050	3896466
C6 - C10 (less BTEX)	mg/kg	ND	2.5	3896466
>C10-C16 Hydrocarbons	mg/kg	ND	10	3896406
>C16-C21 Hydrocarbons	mg/kg	ND	10	3896406
>C21-<C32 Hydrocarbons	mg/kg	ND	15	3896406
Modified TPH (Tier1)	mg/kg	ND	15	3894264
Reached Baseline at C32	mg/kg	Yes	N/A	3896406
Surrogate Recovery (%)				
Isobutylbenzene - Extractable	%	101		3896406
n-Dotriacontane - Extractable	%	104		3896406
Isobutylbenzene - Volatile	%	78		3896466
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected N/A = Not Applicable				

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

GENERAL COMMENTS

Revised report - Change sample id from Test Pit 6 (Surface) to Test Pit 10 (Surface) as per J. Green. 2015-07-03 KMA

Results relate only to the items tested.

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
3895897	ACL	RPD [ZG1087-01]	Moisture	2015/01/26	0.63		%	25
3896406	SPI	Matrix Spike [ZG1088-01]	Isobutylbenzene - Extractable	2015/01/26		101	%	30 - 130
			n-Dotriacontane - Extractable	2015/01/26		109	%	30 - 130
			>C10-C16 Hydrocarbons	2015/01/26		NC	%	30 - 130
			>C16-C21 Hydrocarbons	2015/01/26		96	%	30 - 130
			>C21-<C32 Hydrocarbons	2015/01/26		93	%	30 - 130
3896406	SPI	Spiked Blank	Isobutylbenzene - Extractable	2015/01/26		101	%	30 - 130
			n-Dotriacontane - Extractable	2015/01/26		106	%	30 - 130
			>C10-C16 Hydrocarbons	2015/01/26		103	%	30 - 130
			>C16-C21 Hydrocarbons	2015/01/26		107	%	30 - 130
			>C21-<C32 Hydrocarbons	2015/01/26		86	%	30 - 130
3896406	SPI	Method Blank	Isobutylbenzene - Extractable	2015/01/26		104	%	30 - 130
			n-Dotriacontane - Extractable	2015/01/26		103	%	30 - 130
			>C10-C16 Hydrocarbons	2015/01/26	ND, RDL=10		mg/kg	
			>C16-C21 Hydrocarbons	2015/01/26	ND, RDL=10		mg/kg	
			>C21-<C32 Hydrocarbons	2015/01/26	ND, RDL=15		mg/kg	
3896406	SPI	RPD [ZG1088-01]	>C10-C16 Hydrocarbons	2015/01/26	25		%	50
			>C16-C21 Hydrocarbons	2015/01/26	21		%	50
			>C21-<C32 Hydrocarbons	2015/01/26	NC		%	50
3896466	MCT	Spiked Blank	Isobutylbenzene - Volatile	2015/01/26		92	%	60 - 130
			Benzene	2015/01/26		74	%	60 - 140
			Toluene	2015/01/26		67	%	60 - 140
			Ethylbenzene	2015/01/26		67	%	60 - 140
			Total Xylenes	2015/01/26		71	%	60 - 140
3896466	MCT	Method Blank	Isobutylbenzene - Volatile	2015/01/26		80	%	60 - 130
			Benzene	2015/01/26	ND, RDL=0.025		mg/kg	
			Toluene	2015/01/26	ND, RDL=0.025		mg/kg	
			Ethylbenzene	2015/01/26	ND, RDL=0.025		mg/kg	
			Total Xylenes	2015/01/26	ND, RDL=0.050		mg/kg	
			C6 - C10 (less BTEX)	2015/01/26	ND, RDL=2.5		mg/kg	
3896466	MCT	RPD [ZG1088-01]	Benzene	2015/01/26	NC		%	50
			Toluene	2015/01/26	NC		%	50
			Ethylbenzene	2015/01/26	NC		%	50
			Total Xylenes	2015/01/26	NC		%	50

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC			Parameter	Date	Value	Recovery	Units	QC Limits
Batch	Init	QC Type		Analyzed				
			C6 - C10 (less BTEX)	2015/01/26	NC		%	50
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).</p>								

Maxxam Job #: B511943
Report Date:

SNC-Lavalin Inc
Client Project #: 620891
Site Location: BUTTERPOT PARK
Your P.O. #: 10400
Sampler Initials: JB

VALIDATION SIGNATURE PAGE

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



Paula Chaplin, Project Manager

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

APPENDIX D

Analytical Summary Tables

Table 1: Summary of Soil Sample Results for Petroleum Hydrocarbons

Site	Butter Pot Provincial Park Phase III ESA														RDL	PIRI SOIL ¹ Commercial (mg/kg)			PIRI Protection of Plants & Soil Invertebrates ³ (mg/kg)	
	January 1, 2015 SLI Soil Sampling Program											May 27, 2015 SLI Soil Sampling Program								
	Test Pit 1 (Surface)	Test Pit 1 (Bottom)	Test Pit 2 (Surface)	Test Pit 2 (Bottom)	Test Pit 3 (Surface)	Test Pit 3 (Bottom)	Test Pit 4 (Surface)	Test Pit 4 (Bottom)	Test Pit 5 (Surface)	Test Pit 5 (Bottom)	Test Pit 10 (Surface)	TP6 (Surface)	TP6 (1.5m)	TP7 (Surface)		TP7 (1.9m)	Gasoline	Diesel #2		#6 Oil
Sample ID:	ZG1087	ZG1088	ZG1089	ZG1090	ZG1091	ZG1092	ZG1093	ZG1094	ZG1095	ZG1096	ZG1097	AJG224	AJG225	AJG222	AJG223					
Lab Sample ID:																				
Sample Date:	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/05/27	2015/05/27	2015/05/27	2015/05/27					
Sample Depth (m):	0.0-0.15	1.5	0.0-0.15	1.6	0.0-0.15	1.9	0.0-0.15	1.8	0.0-0.15	1.0	0.0-0.15	0.0-0.15	1.5	0.0-0.15	1.9					
Duplicate of:	--	--	--	--	--	--	--	--	--	--	Test Pit 1 (Surface)	--	--	--	--					
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.042	0.042	0.042	180
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.35	0.35	0.35	250
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	0.043	0.043	0.043	300
Xylene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.73	0.73	0.73	350
C6 - C10 (less BTEX)	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	--	--	--	320
>C10-C16 Hydrocarbons	ND	350	570	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	--	--	--	260
>C16-C21 Hydrocarbons	ND	220	640	160	ND	ND	27	ND	17	ND	ND	ND	ND	ND	ND	10	--	--	--	--
>C21-<C32 Hydrocarbons	ND	60	270	86	64	ND	36	ND	53	ND	ND	31	ND	71	ND	15	--	--	--	1700 ⁴
>C21-<C50 Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					3300
Modified TPH (Tier1)	ND	640	1500	370	64	ND	63	ND	70	ND	ND	31	ND	71	ND	20	870	1800 ²	10,000	--
Reached Baseline at C32	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	--	--	--	--	--
Resemblance	--	Comment 1	Comment 1	Comment 2	Comment 3	--	Comment 4	--	Comment 4	--	--	Comment 3	--	Comment 3	--	--	--	--	--	--

Table Notes:

¹ Reference: Provincial PIRI Soil - Tier I Risk Based Screening Levels For Soil (Commercial, Potable Water, Coarse-Grained Soil) (Update January 2015).

² **Bold and italic** indicates most applicable to site conditions.

³ Reference: Provincial PIRI Soil - Tier I Soil Ecological Screening Levels for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (mg/kg dry weight) (Update January 2015) taken from the CCME CEQG (1999) and CCME CWS (CCME 2008).

⁴ CWS fractions vary from the Atlantic RBCA Tier I reported fractions; however, soil data obtained is combined to be reported as the CWS fractions and compared directly to the values in this table.

Shaded values exceed the applicable criteria

ND - Not detected above reportable detection limit; NA - Not applicable; -- no guideline

-- Not Applicable

(1) Weathered fuel oil fraction.

(2) Weathered fuel oil fraction. Lube oil range.

(3) No resemblance to petroleum products in lube oil range.

(4) One product in fuel/lube oil range.

Table 2 - PAHs in Soil Laboratory Analytical Results (mg/kg)

Site		Butter Pot Park														Canadian Soil Quality Guidelines ¹				
Sampling Program		January 19, 2015 Soil Sampling Program										May 27, 2015 Sampling Program								
Sample ID and Depth		Test Pit 1 (Surface)	Test Pit 1 (Bottom)	Test Pit 2 (Surface)	Test Pit 2 (Bottom)	Test Pit 3 (Surface)	Test Pit 3 (Bottom)	Test Pit 4 (Surface)	Test Pit 4 (Bottom)	Test Pit 5 (Surface)	Test Pit 5 (Bottom)	Test Pit 10 (Surface)	TP6 (Surface)	TP6 (1.5m)	TP7 (Surface)	TP7 (1.9 m)	Human Health		Environmental Health	
Lab Sample ID:		ZH1237	ZH1238	ZH1239	ZH1240	ZH1241	ZH1242	ZH1243	ZH1244	ZH1245	ZH1246	ZH1247	AJO862	AJO863	AJO860	AJO861	SGQ _{DH} ⁴		SGQ _E	
Sample Date:		2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/01/19	2015/05/27	2015/05/27	2015/05/27	2015/05/27	carcinogenic effects of PAHs	non-carcinogenic		
Is the sampling location likely contaminated by Coal Tar and/or Creosote? (answer "Y" or leave blank)																	direct human contact	guidelines from other jurisdictions ³		
Is there a drinking water well in the immediate area of the sampling location? (answer "Y" or leave blank)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				
Is there likely freshwater aquatic life (within a natural freshwater body) on or in the immediate area of the site which could be impacted? (answer "Y" or leave blank)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				
																	RDL			
1-Methylnaphthalene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
2-Methylnaphthalene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Acenaphthene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Acenaphthylene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Anthracene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	32
Benzo(a)anthracene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Benzo(a)pyrene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	72
Benzo(b)fluoranthene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Benzo(g,h,i)perylene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Benzo(j)fluoranthene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Benzo(k)fluoranthene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Chrysene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Dibenz(a,h)anthracene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Fluoranthene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	180
Fluorene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Indeno(1,2,3-cd)pyrene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	10
Naphthalene ⁶		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Perylene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Phenanthrene ⁶		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	--
Pyrene		ND	0.019	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	--	--	100
Benzo[a]pyrene Total Potency Equivalents ²		0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	--	5.3	--	--
Initial B[a]P TPE before Factor of Safety of 3 is applied		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	--	--	--	--
IACR ⁵		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--

Bold and grey highlighted values exceed applicable

ND - Not detected above RDL (reportable detection limit); NA - Not applicable;

"--"= no guideline available or parameter not analyzed;

¹ CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, PAHs (2010), Commercial. SQG_{DH} = human health-based soil quality guideline for direct contact; SQG_{PW} = soil quality guideline for the protection of potable water; SQG_E = soil quality guideline for environmental health

² Where applicable, the Calculated B[a]P TPE is multiplied by a Safety Factor of 3 for cases where soil contamination by Coal Tar and/or Creosote mixtures is suspected. (1/2 RDL used to calculate B[a]P TPE).

³ The 2010 Canadian Soil Quality Guidelines indicate that protection of human health from non-carcinogenic effects of PAHs was not assessed, and recommends that guidelines from other jurisdictions be consulted. For the purpose of this report, no comparisons to guidelines from other jurisdictions have been made.

⁴ SQG_{DH} is based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10⁻⁵)

⁵ IACR = Index of Additive Cancer Risk assesses potential threats to potable groundwater water quality from leaching carcinogenic unsubstituted PAHs. When groundwater is not used on site or on the adjacent site for drinking water, then IACR is assigned a value of zero.

⁶ Two criteria are embedded in this table. The lowest of the two SQG_E is for protection of freshwater life. If impact to surface water is not a concern, the higher SQG_E (i.e. 1997 provisional SQG_E for naphthalene and 1991 Interim Soil Quality Criteria for phenanthrene) is applied automatically.

Table 3: Summary of Groundwater Sample Results for Petroleum Hydrocarbons

Site	Butter Pot Provincial Park Phase III ESA					RDL	PIRI SOIL ¹ Commercial (mg/L)			PIRI Surface Water & Groundwater Ecological Screening Levels for the Protection of Freshwater and marine Aquatic Life (mg/L) ³
	MW-1	MW-2	MW-3	MW-4	MW-5 (Duplicate of MW-2)		Gasoline	Diesel #2	#6 Oil	
Sample ID:										
Lab Sample ID:	AKX996	AKX998	AKX999	AKY000	AKY001					
Sample Date:	2015/06/09	2015/06/09	2015/06/09	2015/06/09	2015/01/19					
Benzene	ND	ND	ND	ND	ND	0.001	0.005	0.005	0.005	4.6
Toluene	ND	ND	ND	ND	ND	0.001	0.024	0.024	0.024	4.2
Ethylbenzene	ND	ND	ND	ND	ND	0.001	0.0016	0.0016	0.0016	3.2
Xylene (Total)	ND	ND	ND	ND	ND	0.002	0.02	0.02	0.02	2.8
C6 - C10 (less BTEX)	ND	ND	ND	ND	ND	0.01	--	--	--	320
>C10-C16 Hydrocarbons	ND	ND	ND	ND	ND	0.05	--	--	--	260
>C16-C21 Hydrocarbons	ND	ND	ND	ND	ND	0.05	--	--	--	--
>C21-<C32 Hydrocarbons	ND	ND	ND	ND	ND	0.1	--	--	--	--
Modified TPH (Tier1)	ND	ND	ND	ND	ND	0.1	4.4	3.2²	7.8	0.84²
Reached Baseline at C32	Yes	Yes	Yes	Yes	Yes	--	--	--	--	--
Resemblance	--	--	--	--	--	--	--	--	--	--

Table Notes:

¹ Reference: Provincial PIRI Groundwater - Tier I Risk Based Screening Levels For Groundwater (Commercial, Potable Water, Coarse-Grained Soil) (Update January 2015).

² ***Bold and italic*** indicates most applicable to site conditions.

³ Reference: Provincial PIRI Soil - Tier I Groundwater Ecological Screening Levels for the Protection of Freshwater and Marine Aquatic Life (mg/L); evaluating groundwater at locations greater than 10 metres from a freshwater body (Update January 2015)
Shaded values exceed the applicable criteria

ND - Not detected above reportable detection limit; NA – Not applicable; -- no guideline

Table 4: Summary of Petroleum Hydrocarbons for Drinking Water (mg/L)

Site	Butter Pot Provincial Park Phase III ESA	RDL	Health Canada DWQG ¹ mg/L	
	TAP-1		MAC ² mg/L	AO ³ mg/L
Sample ID:	AKY002			
Lab Sample ID:	2015/01/19			
Sample Date:				
Benzene	ND	0.001	0.005	--
Toluene	ND	0.001	0.06	0.024
Ethylbenzene	ND	0.001	0.14	0.0016
Xylene (Total)	ND	0.002	0.09	0.02
C6 - C10 (less BTEX)	ND	0.01	--	--
>C10-C16 Hydrocarbons	ND	0.05	--	--
>C16-C21 Hydrocarbons	ND	0.05	--	--
>C21-<C32 Hydrocarbons	ND	0.1	--	--
Modified TPH (Tier1)	ND	0.1	--	--
Reached Baseline at C32	Yes	--	--	--
Resemblance	--	--	--	--

Table Notes:

¹ Reference: Health Canada Drinking Water Quality Guidelines (October 2014)

² Maximum Acceptable Concentrations (MAC) - Health based guidelines

³ Reference: Aesthetic Objectives (AO) - Based on aesthetic considerations

Shaded values exceed the applicable criteria

ND - Not detected above reportable detection limit; -- no guideline

Table 5: Summary of PAH Analytical Results in Groundwater (ug/ L)

Sample ID: Sample Date: Lab ID:	MW-1 2015/06/09 ALF981	MW-2 2015/06/09 ALF982	MW-3 2015/06/09 ALF983	MW-4 2015/06/09 ALF984	Ontario MOE (ug/ L) ¹
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	ND	ND	ND	ND	3.2
2-Methylnaphthalene	ND	ND	ND	ND	3.2
Acenaphthene	ND	ND	ND	ND	4.1
Acenaphthylene	ND	ND	ND	ND	1
Anthracene	ND	ND	ND	ND	1
Benzo(a)anthracene	ND	ND	ND	ND	1
Benzo(a)pyrene	ND	ND	ND	ND	0.01
Benzo(b)fluoranthene	ND	ND	ND	ND	0.1
Benzo(g,h,i)perylene	ND	ND	ND	ND	0.2
Benzo(j)fluoranthene	ND	ND	ND	ND	-
Benzo(k)fluoranthene	ND	ND	ND	ND	0.1
Chrysene	ND	ND	ND	ND	0.1
Dibenz(a,h)anthracene	ND	ND	ND	ND	0.2
Fluoranthene	ND	ND	ND	ND	0.41
Fluorene	ND	ND	ND	ND	120
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	0.2
Naphthalene	ND	ND	ND	ND	7
Perylene	ND	ND	ND	ND	-
Phenanthrene	ND	ND	ND	ND	1
Pyrene	ND	ND	ND	ND	4.1

1) Applied Guideline: Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Ontario Ministry of the Environment (April 15, 2011) Table 6: Generic Condition Standards for Shallow Soils in A Potable Ground Water Condition (All Types of Property Use)

Shaded data exceeds Guidelines
 - no guideline for parameter available

Table 6: Summary of PAH Analytical Results for Drinking Water (mg/ L)

Sample ID: Sample Date:	TAP-1	Health Canada DWQG ¹ mg/L
	2015/06/09	
Lab ID:	ALF985	MAC ²
Polyaromatic Hydrocarbons		
1-Methylnaphthalene	ND	--
2-Methylnaphthalene	ND	--
Acenaphthene	ND	--
Acenaphthylene	ND	--
Anthracene	ND	--
Benzo(a)anthracene	ND	--
Benzo(a)pyrene	ND	0.00001
Benzo(b)fluoranthene	ND	--
Benzo(g,h,i)perylene	ND	--
Benzo(j)fluoranthene	ND	--
Benzo(k)fluoranthene	ND	--
Chrysene	ND	--
Dibenz(a,h)anthracene	ND	--
Fluoranthene	ND	--
Fluorene	ND	--
Indeno(1,2,3-cd)pyrene	ND	--
Naphthalene	ND	--
Perylene	ND	--
Phenanthrene	ND	--
Pyrene	ND	--

Table Notes:

¹ Reference: Health Canada Drinking Water Quality Guidelines (October 2014)

² Maximum Acceptable Concentrations (MAC) - Health based guidelines

Shaded values exceed the applicable criteria

ND - Not detected above reportable detection limit; -- no guideline

APPENDIX E

QA/QC Program

Table 1: QA/ QC BTEX/ TPH in Soil Analytical Results

Parameters	Butter Pot Park				
	Sample Identification		QA/ QC Results		
	TEST PIT 1 (SURFACE)	TEST PIT 10 (SURFACE) Duplicate	Absolute difference	Average	Relative Percent Difference
Benzene	0.0125	0.0125	0	0.0125	0.00%
Toluene	0.0125	0.0125	0	0.0125	0.00%
Ethylbenzene	0.0125	0.0125	0	0.0125	0.00%
Xylene (Total)	0.025	0.025	0	0.0250	0.00%
C ₆ -C ₁₀ (less BTEX)	1.25	1.25	0	1.25	0.00%
> C ₁₀ -C ₁₆	5	5	0	5.00	0.00%
> C ₁₆ -C ₂₁	5	5	0	5.00	0.00%
>C ₂₁ -<C ₃₂	7.5	7.5	0	7.50	0.00%
Modified TPH	7.5	7.5	0	7.50	0.0%
Relative Percent Difference:					0.00%

Assumptions: _____

The difference between two non-detected values was considered to be 0.
 For differences between a detected value and a non-detected value, the non-detected value is assumed to be 1/2 RDL

Table 2: QA/ QC BTEX/ TPH in Groundwater Analytical Results

Parameters	Butter Pot Park				
	Sample Identification		QA/ QC Results		
	MW-2	MW-5 Duplicate	Absolute difference	Average	Relative Percent Difference
Benzene	0.0005	0.0005	0	0.0005	0.00%
Toluene	0.0005	0.0005	0	0.0005	0.00%
Ethylbenzene	0.0005	0.0005	0	0.0005	0.00%
Xylene (Total)	0.001	0.001	0	0.0010	0.00%
C ₆ -C ₁₀ (less BTEX)	0.005	0.005	0	0.0050	0.00%
> C ₁₀ -C ₁₆	0.025	0.025	0	0.0250	0.00%
> C ₁₆ -C ₂₁	0.025	0.025	0	0.0250	0.00%
>C ₂₁ -<C ₃₂	0.05	0.05	0	0.0500	0.00%
Modified TPH	0.05	0.05	0	0.0500	0.0%
Relative Percent Difference:					0.00%

Assumptions: _____

The difference between two non-detected values was considered to be 0.
 For differences between a detected value and a non-detected value, the non-detected value is assumed to be 1/2 RDL

Table 3: QA/ QC PAHs in Soil Analytical Results

Parameters	Butter Pot Park				
	Sample Identification		QA/ QC Results		
	TEST PIT 1 (SURFACE)	TEST PIT 10 (SURFACE) Duplicate	Absolute difference	Average	Relative Percent Difference
1-Methylnaphthalene	0.005	0.005	0	0.005	0.00%
2-Methylnaphthalene	0.005	0.005	0	0.005	0.00%
Acenaphthene	0.005	0.005	0	0.005	0.00%
Acenaphthylene	0.005	0.005	0	0.005	0.00%
Anthracene	0.005	0.005	0	0.005	0.00%
Benzo(a)anthracene	0.005	0.005	0	0.005	0.00%
Benzo(a)pyrene	0.005	0.005	0	0.005	0.00%
Benzo(b)fluoranthene	0.005	0.005	0	0.005	0.00%
Benzo(g,h,i)perylene	0.005	0.005	0	0.005	0.00%
Benzo(j)fluoranthene	0.005	0.005	0	0.005	0.00%
Benzo(k)fluoranthene	0.005	0.005	0	0.005	0.00%
Chrysene	0.005	0.005	0	0.005	0.00%
Dibenz(a,h)anthracene	0.005	0.005	0	0.005	0.00%
Fluoranthene	0.005	0.005	0	0.005	0.00%
Fluorene	0.005	0.005	0	0.005	0.00%
Indeno(1,2,3-cd)pyrene	0.005	0.005	0	0.005	0.00%
Naphthalene	0.005	0.005	0	0.005	0.00%
Perylene	0.005	0.005	0	0.005	0.00%
Phenanthrene	0.005	0.005	0	0.005	0.00%
Pyrene	0.005	0.005	0	0.005	0.0%
Relative Percent Difference:					0.00%

Assumptions:

The difference between two non-detected values was considered to be 0.
 For differences between a detected value and a non-detected value, the non-detected value is assumed to be 1/2 RDL

APPENDIX F

Test Pit Logs



Location of Test Pit 1.



Test Pit 1 after being backfilled.

Test Pit Identification Number	Depth	Soil Description
Test Pit 1 5249687N 345687E	0.0 – 0.15	Dark brown, dry, loose, soil/gravel with organics.
	0.15 – 1.0	Brown, dry, loose, soil/gravel.
	1.0 – 1.5	Brown, dry, loose, soil/gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: January 19, 2015

Notes

- Located directly in front of the parks generator shed, in a parking lot.
- Buckle's Contracting subcontracted to perform test pit operations.
- 210 John Deere excavator used for test pit digging.



Location of Test Pit 2.



Test Pit 2.

Test Pit Identification Number	Depth	Soil Description
Test Pit 2 5249674N 345692E	0.0 – 0.15	Dark brown dry, soil/gravel with organics.
	0.15 – 1.0	Light Brown, dry, loose, soil/gravel.
	1.0 – 1.6	Light Brown, dry, loose, soil/gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: January 19, 2015

Notes

- Located in wooded area alongside the generator shed, with trees, branches and bushes.
- Buckle's Contracting subcontracted to perform test pit operations.
- 210 John Deere excavator used for test pit digging.



Test Pit 3.



Test Pit 3.

Test Pit Identification Number	Depth	Soil Description
Test Pit 3 5249666N 345696E	0.0 – 0.15	Dark Brown, dry, loose, topsoil with organics.
	0.15 – 1.0	Light Brown, dry, fine, loose, soil/gravel.
	1.0 – 1.9	Light Brown, dry, loose, soil/gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: January 19, 2015

Notes

- Located in alongside a shed, with branches, low growing shrubs and bushes.
- Buckle's Contracting subcontracted to perform test pit operations.
- 210 John Deere excavator used for test pit digging.



Test Pit 4 Location.



Test Pit 4.

Test Pit Identification Number	Depth	Soil Description
Test Pit 4 5249678N 345667E	0.0 – 0.15	Light brown dry, topsoil/gravel with organics.
	0.15 – 1.0	Light brown dry, topsoil/gravel.
	1.0 – 1.8	Light brown dry, topsoil/gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: January 19, 2015

Notes

- Located between workshop and wooded area, with grass, branches and bushes.
- Buckle's Contracting subcontracted to perform test pit operations.
- 210 John Deere excavator used for test pit digging.



Test Pit 5.



Test Pit 5.

Test Pit Identification Number	Depth	Soil Description
Test Pit 5 5249668N 345676E	0.0 – 0.15	Dark brown dry, topsoil/gravel with organics.
	0.15 – 1.0	Light brown dry, topsoil/gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: January 19, 2015

Notes

- Located in wooded area, with tree stumps and branches, low growing shrubs, bushes, and mosses. Public trail alongside test pit location.
- Buckle's Contracting subcontracted to perform test pit operations.
- 210 John Deere excavator used for test pit digging.
- Test pit repositioned to accommodate excavator access.



Test Pit 6.



Test Pit 6.

Test Pit Identification Number	Depth	Soil Description
Test Pit 6 5249667N 345692E	0.0 – 0.2	Dark brown dry, topsoil/gravel with organics.
	0.2 – 1.5	Light grey dry, coarse pebble and gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: May 27, 2015

Notes

- Located between generator shed and storage shed, with tree stumps and branches, low growing shrubs, bushes, and mosses.
- Larry Kings Excavating subcontracted to perform test pit operations.
- Rubber Tire Backhoe used for test pit digging.



Test Pit 7.



Test Pit 7.

Test Pit Identification Number	Depth	
Test Pit 7 5249675N 345703E	0.0 – 0.3	Dark brown dry, topsoil/gravel with organics.
	0.3 – 1.9	Light grey dry, coarse pebble and gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: May 27, 2015

Notes

- Located north of the storage shed, with tree stumps and branches, low growing shrubs, bushes, and mosses.
- Larry Kings Excavating subcontracted to perform test pit operations.
- Rubber Tire Backhoe used for test pit digging.



Test Pit 8.



Test Pit 8.

Test Pit Identification Number	Depth	
Test Pit 8 5249669N 345691E	0.0 – 0.4	Dark brown dry, topsoil/gravel with organics.
	0.4 – 1.8	Light grey dry, coarse pebble and gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: May 27, 2015

Notes

- Located south of the storage shed, with tree stumps and branches, low growing shrubs, bushes, and mosses.
- Larry Kings Excavating subcontracted to perform test pit operations.
- Rubber Tire Backhoe used for test pit digging.



Test Pit 9.



Test Pit 9.

Test Pit Identification Number	Depth	
Test Pit 9 5249679N 345705E	0.0 – 0.3	Dark brown dry, topsoil/gravel with organics.
	0.3 – 1.8	Light grey dry, coarse pebble and gravel. Test pit terminated due to bedrock.

Location: Butter Pot Provincial Park.

Date: May 27, 2015

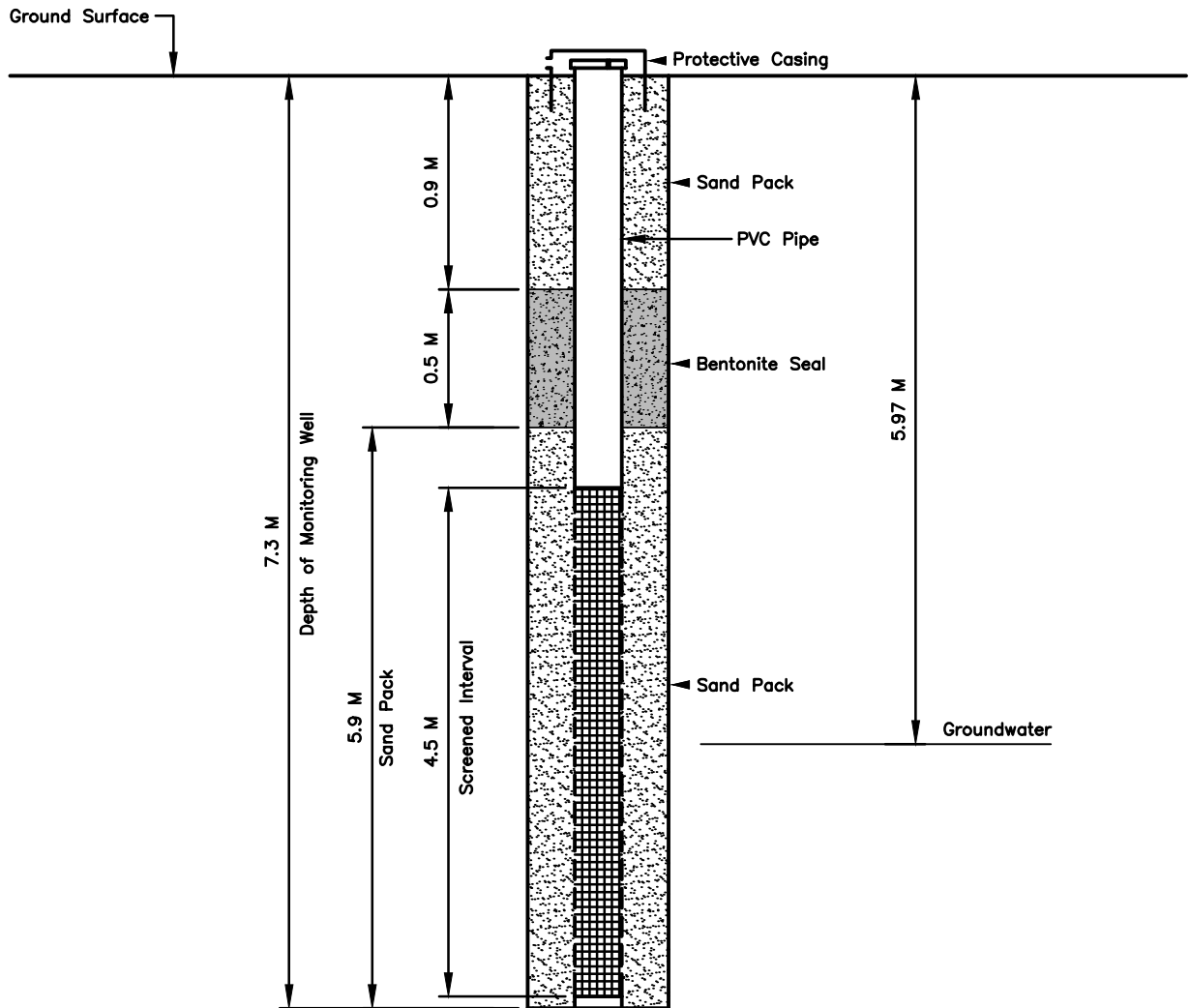
Notes

- Located north of the storage shed, with tree stumps and branches, low growing shrubs, bushes, and mosses.
- Larry Kings Excavating subcontracted to perform test pit operations.
- Rubber Tire Backhoe used for test pit digging.

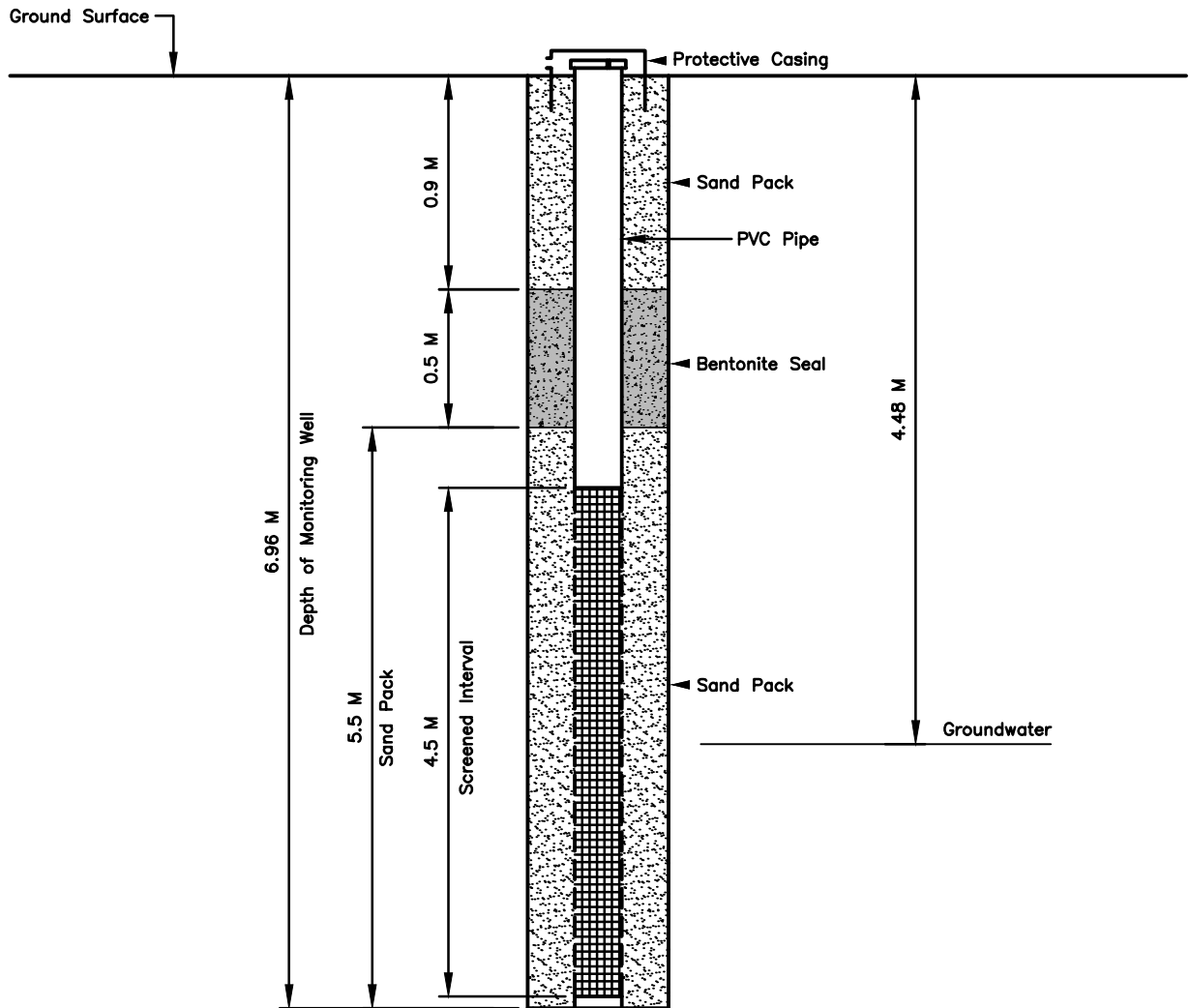
APPENDIX G

Monitoring Well Logs

CLIENT	DEC	PROJECT NO.	620891
LOCATION	BUTTER POT PARK NEWFOUNDLAND & LABRADOR	DATE (dd/mm/yy)	LOGGED BY: JASON GREEN
		30/06/15	



CLIENT	DEC	PROJECT NO.	620891
LOCATION	BUTTER POT PARK NEWFOUNDLAND & LABRADOR	DATE (dd/mm/yy)	LOGGED BY: JASON GREEN
		30/06/15	



MONITOR WELL LOG

MW-3

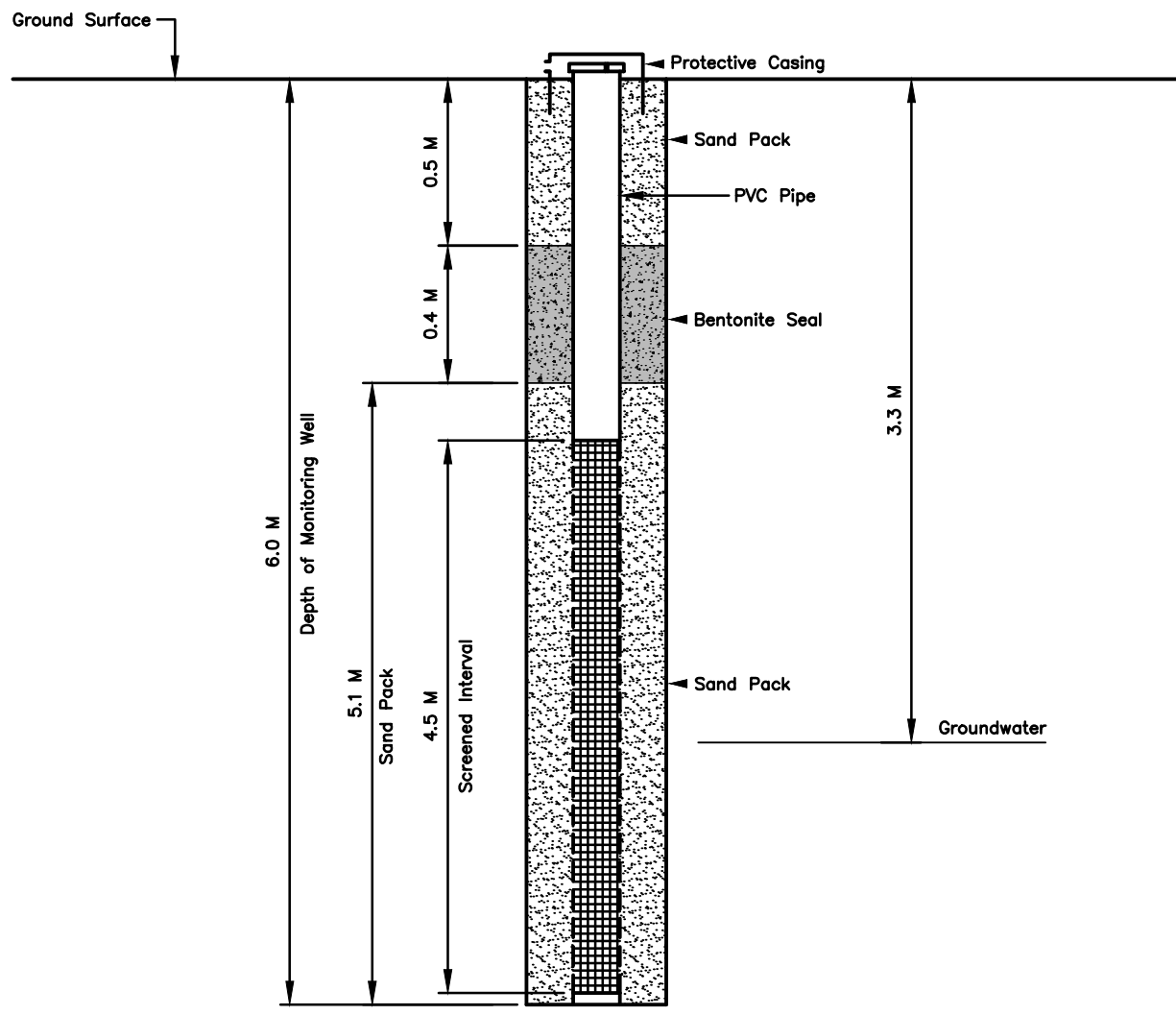
CLIENT **DEC**

PROJECT NO. **620891**

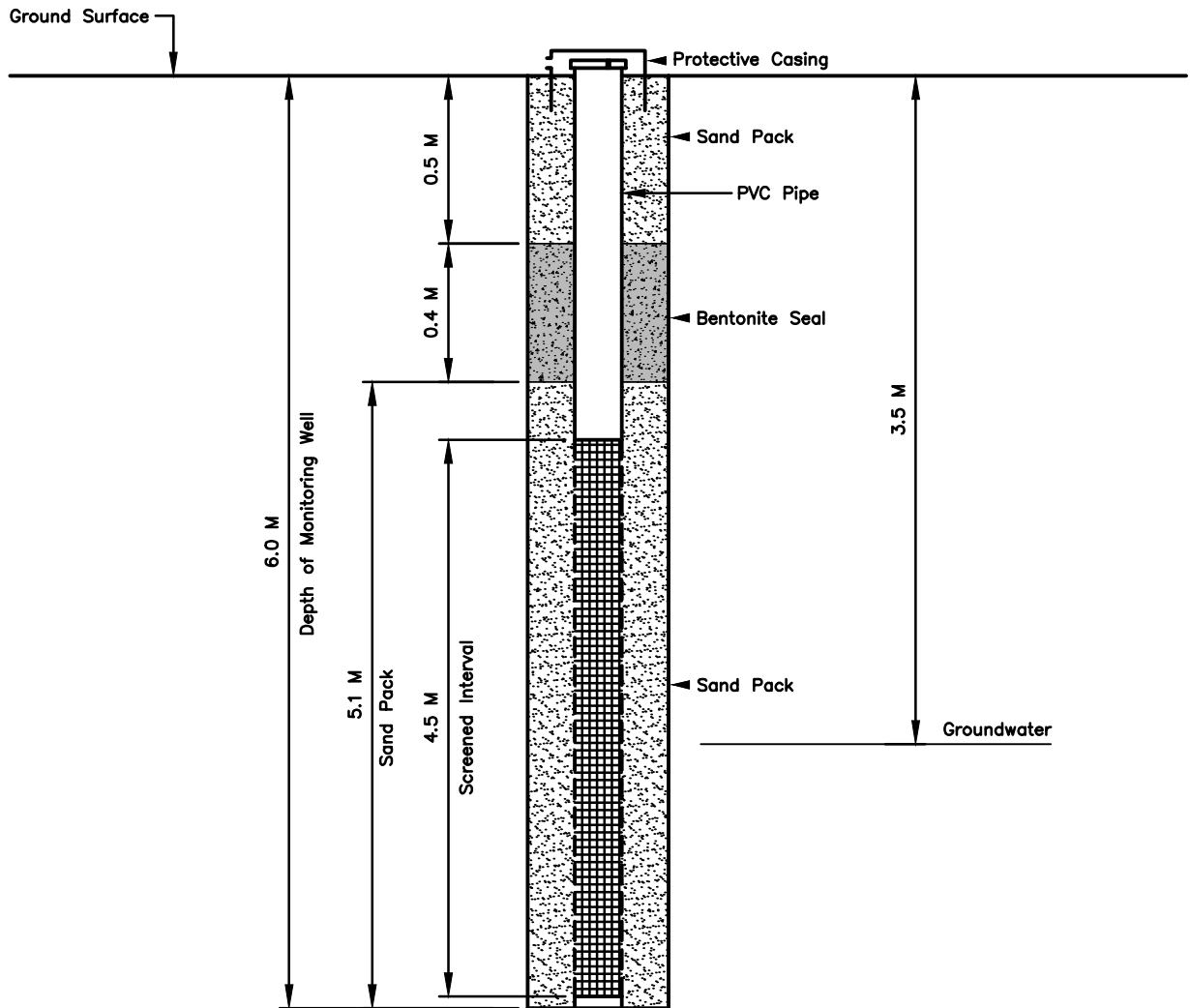
LOCATION **BUTTER POT PARK
NEWFOUNDLAND & LABRADOR**

DATE (dd/mm/yy)
30/06/15

LOGGED BY: **JASON GREEN**



CLIENT	DEC	PROJECT NO.	620891
LOCATION	BUTTER POT PARK NEWFOUNDLAND & LABRADOR	DATE (dd/mm/yy)	LOGGED BY: JASON GREEN
		30/06/15	



APPENDIX H

Ecological Screening Protocol

SUMMARY TABLE - RESULTS OF ECOLOGICAL SCREENING PROTOCOL FOR PETROLEUM IMPACTED SITES

Instructions to Practitioners: This table is intended to summarize the results of the Ecological Screening Protocol and must be completed in consultation with guidance provided in the protocol. Users should include this completed table in their Environmental Assessment or Closure Report. Details and explanations are to be provided in the body of the Report.

Ecological Screening Component	Yes or No	Report name and location of details and explanations
Part I – Identification of petroleum hydrocarbons in media		
1. Do site characterization data indicate the presence of PHC in site <u>surface soil</u> (depth < 1.5 m) above the appropriate screening levels in Tables 1a and 1b?	Yes	Soil samples exceed applicable guidelines.
2. Do site characterization data indicate the presence of PHC in <u>shallow site groundwater</u> (depth <3.0 m) above appropriate ecological screening levels that were derived for the protection of terrestrial plants and soil invertebrates in contact with site groundwater in Table 2?	No	Hydrocarbon contamination was not detected in any of the monitoring wells at the Site.
3. Do existing site characterization data indicate the presence of PHC in site <u>groundwater</u> above appropriate ecological screening levels derived for the protection of aquatic receptors in Table 3a/3b?	No	Hydrocarbon contamination was not detected in any of the monitoring wells at the Site.
4. Do site characterization data indicate the presence of PHC in site <u>surface water</u> above the appropriate screening levels in Table 3?	No	Surface water not present at the Site.
5. Does site characterization indicate the presence of PHC in on-site or adjacent <u>sediments</u> above the appropriate screening levels in Table 4?	No	Sediments not present at the Site.
IF ALL ANSWERS IN PART I ARE "NO" THEN NO FURTHER ACTION IS REQUIRED		
Part II – Identification of habitat and ecological receptors		
1. Are the following habitat types or conditions present on the site or proximate to the site within a minimum of 200 metres?	Yes	Provincial Park, aquatic and forested habitats.
<ul style="list-style-type: none"> • wetland habitats • aquatic habitats • forested habitats • grassland habitats • provincial/national parks or ecological reserves • known rare, threatened or endangered species • other known critical or sensitive habitat • other local or regional receptor or habitat concerns 		
2a. Are there visible indications of stressed vegetation on the site?	No	None observed
2b. Is there evidence that the site vegetation community differs from what would be expected?	No	None observed
2c. Are there indications that the site soil cannot support a soil invertebrate community?	No	None observed

Ecological Screening Component	Yes or No	Report name and location of details and explanations
3. Is there evidence that terrestrial plants in the habitats above are likely to be in root contact with site groundwater above screening levels?	No	Shallow bedrock on site. Groundwater below bedrock.
4. Would wildlife receptors be expected to forage on or near the contaminated areas of the site?	Yes	
Part III - Identification of exposure pathways for ecological receptors		
1a. Is it reasonable to conclude that site hydrocarbons in surface soil with concentrations exceeding applicable screening levels, will come into contact with terrestrial plants and invertebrates in a suitable habitat?	Yes	
1b. Is it reasonable to conclude that site Hydrocarbons in surface soil with concentrations exceeding applicable screening levels, will come into contact with mammalian, avian or herptile terrestrial receptors within an agricultural land use in a suitable habitat?	No	
2. Is it reasonable to conclude that dissolved hydrocarbons in site groundwater with concentrations exceeding applicable screening levels will come into contact with plants or soil invertebrates in a suitable habitat?	No	Groundwater samples show no hydrocarbon contamination at the site.
3. Is it reasonable to conclude that dissolved hydrocarbons in site groundwater with concentrations exceeding applicable screening levels will come into contact with aquatic receptors or aquatic receptor habitat?	No	Groundwater samples show no hydrocarbon contamination at the site.
4. Is it reasonable to conclude that site petroleum, hydrocarbon contamination could impact aquatic receptors or aquatic habitat in surface water bodies via the following: a. surface runoff (e.g. erosion, windblown contaminants) b. groundwater flow c. preferential overland flow pathways (e.g. drainage ditch, slope, swale) d. preferential subsurface flow pathways (e.g. culvert, trench, sewer line, pipelines, swales) such that aqueous media concentrations would potentially exceed surface water and/or sediment quality screening levels?	Yes	
Are there site specific conditions present, which were not considered in any section above that should require further ecological assessment?	No	
IF ALL ANSWERS IN PART III ARE "NO" THEN NO FURTHER ACTION IS REQUIRED.		



SNC • LAVALIN

1133 Topsail Road
Mount Pearl, NL A1N 5G2
(709) 368-0118 - (709) 368-0158