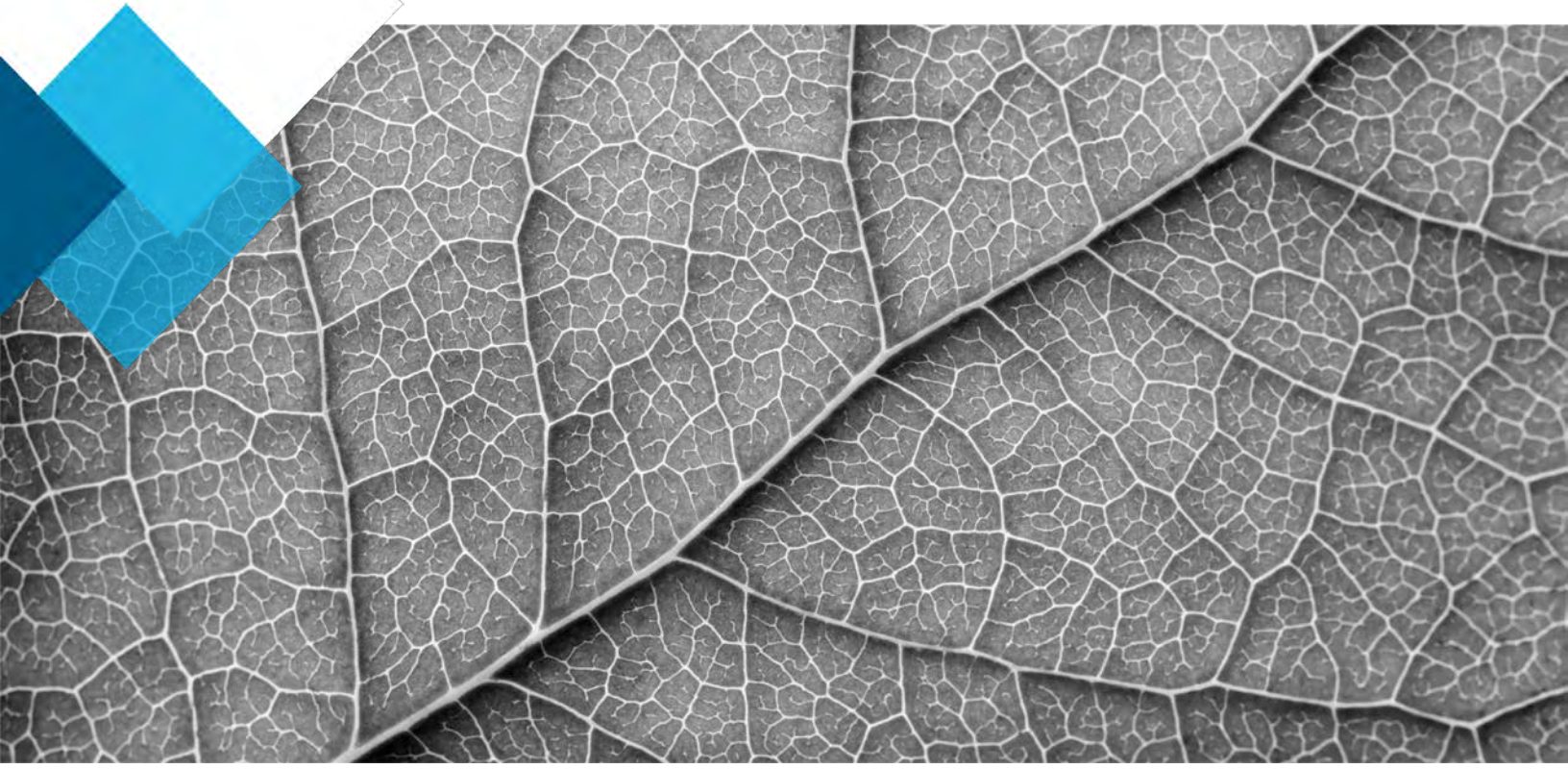
SNC·LAVALIN

CENTRAL PARK - 171 BAY STREET NORTH, HAMILTON, ONTARIO

REPORT - Supplemental Phase II Environmental Site Assessment

The City of Hamilton



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Executive Summary

SNC-Lavalin was retained by the City of Hamilton to conduct a Supplementary Phase II Environmental Site Assessment (ESA) at 171 Bay Street North, Central Park in Hamilton, Ontario.

The site is used as a park and consists of open grassed areas with some paved pedestrian walkways. Current land use in the vicinity of the site is primarily residential, with a City of Hamilton Central Services Building at 125 Caroline Street North to the north of the site, and an EMS Building at 177 Bay Street North to the northeast of the site. The site is municipally serviced with water from the municipal drinking water system, which is sourced from Lake Ontario. Wastewater from the splash pad is discharged via catch basins into the sewer system which crosses the site. Based on current input form the City the Site is anticipated to remain as parkland for the foreseeable future.

Landshark Drilling was retained by SNC-Lavalin to drill 30 boreholes (BH 18-01 to BH 18-30) at the site between August 28, 2018 and September 17, 2018. Depth of boreholes ranged between 1.5 m bgs to 17.4 m bgs. Nineteen boreholes were completed as monitoring wells and four other boreholes were completed as soil vapour probes.

The near surface overburden material investigated at the site is comprised predominantly of fill, comprising silty sand interspersed with waste materials and debris including brick debris, asphalt fragments, glass, wood, black aggregate, ash and tar like residue. The fill was typically underlain by a native silty sand which is subsequently underlain by a silty clay unit.

Deeper monitoring wells, screened between 79.14 m and 71.21 m asl, had an average horizontal hydraulic gradient of 0.014 m/m, with an inferred groundwater flow direction towards the north. Shallow monitoring wells, with screened intervals between 91.65 m to 79.33 m asl, had an average horizontal hydraulic gradient of 0.03 m/m with an inferred groundwater flow direction towards the northwest and north.

The hydraulic gradients and groundwater flow directions are generally consistent with the results from previous investigations. Hydraulic conductivity of upper fill layer is estimated to be on the order of 6.9×10^{-7} m/sec.

Soil grain size analysis confirmed that soil present at the site is predominantly composed of material that is greater than 75 µm in diameter. Accordingly the soil texture at the site is classified as coarse textured.

Based on the field screening the maximum volatile organic vapour reading of 225 ppmv and combustible organic vapour reading of 110 ppmv were measured from soil sample BH18-27-5. OVM and PID readings measured for soil samples collected during drilling ranged from < 5 ppmv to 225 ppmv and <5 ppmv to 110 ppmv, respectively.

Field observations during drilling and soil sampling identified the presence of dark brown to black staining in soil at most boreholes with the exceptions of BH18-01, BH18-05 and BH18-11 to BH18-15. Black staining was typically accompanied by a tar-like odour and in several locations the presence of black sheen was noted on soil samples. Debris was observed to be widespread in the fill material present at the site.

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Concentrations of one or more of petroleum hydrocarbons (PHC) fraction F2, and/or F3 exceeded the selected MECP Table 5 standards in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-11 and BH18-5, and in subsurface soil samples collected from boreholes BH18-06, BH18-07, BH18-15, BH18-25, BH18-26, BH18-27, BH18-28 and BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for one or more metals and inorganics parameters were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10, BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18 and in subsurface soil samples collected from boreholes BH18-06, BH18-08, BH18-16, BH18-18, BH18-23, BH18-25, BH18-28 and BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for one or more polycyclic aromatic hydrocarbon (PAH) parameters were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10, BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18 and in in subsurface soil samples collected from boreholes BH18-04, BH18-06, BH18-07, BH18-10, BH18-14, BH18-17, BH18-18 and BH18-25 to BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for total polychlorinated biphenyls (PCBs) were identified in shallow soil samples collected from boreholes BH18-08 and BH18-09 while no sub-surface soil samples had concentrations of PCB parameters that exceeded the selected MECP Table 5.

Analytical results for the composite soil sample submitted for O. Reg. 347 waste classification indicate that soil cuttings produced during investigation activities may be classified as non-hazardous waste.

The maximum on-site concentrations of PHC F2 and F3 in soil exceed the free phase threshold, predicting the potential presence of free phase liquid in boreholes BH18-06, BH18-27 and BH18-28 as well as potential naphthalene at BH18-27.

Concentrations of one or more of benzene and PHCs F2 and F3 exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-101, MW-104, MW-115, MW-17-17 and MW18-25 to MW18-30 during September 2018. A number of the reported concentrations exceed the theoretical solubility limit for the parameter.

Concentrations of the volatile organic compound (VOC) parameter, trichloroethylene, exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-103, MW18-04 and MW18-24 during September 2018.

Concentrations of one or more PAH parameters exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-104, MW-115, MW-202, MW-17-17 and MW18-25 to MW18-29.

Concentrations of zinc exceeded the selected MECP Table 5 standards in the groundwater sample collected from monitoring well MW-203, during September 2018.

All groundwater samples submitted for analysis for PCBs, satisfied the selected MECP Table 5 standards.

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While no measurable NAPL was observed during monitoring and sampling, concentrations of some parameters of were above the corresponding theoretical ½ solubility limit indicating the potential for free-phase product to be present in groundwater.

Soil vapour concentrations of one or both of benzene and naphthalene exceed the health based indoor air criteria for residential settings, if not corrected for attenuation that is applied to account for migration into a building through a concrete floor slab. Based on the observed concentration of benzene at SVP18-04 it is expected that even if a conservative attenuation factor of 0.02 were applied, there is an identified potential for unacceptable impacts to indoor air at this location. It is understood that no buildings and/or enclosed structures are proposed as part of the current park redevelopment plans.

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1 Introduction

The Environment and Geoscience business unit of SNC-Lavalin was retained by the City of Hamilton (the City) to conduct a Supplementary Phase II Environmental Site Assessment (ESA) at 171 Bay Street North, Central Park in Hamilton, Ontario (the "site"). The work was completed in accordance with the SNC-Lavalin proposals dated June 29, 2018, reissued September 25, 208. This report documents the methodology and results of the Supplementary Phase II ESA.

1.1 Site Description and Property Ownership

The site is located at 171 Bay Street North, Hamilton, Ontario (refer to Figure 1). The site has an irregular shape and measures approximately 26,250 m^2 (2.6 ha) in area. The current layout of the park is shown on Figure 2 and consists of open grassed areas with some paved pedestrian walkways. A baseball diamond is present in the southern portion of the park, and tennis and basketball courts are present in the eastern portion. A playground and splash pad are located in the centre of the park, with the splash pad maintenance building located to the south of the splash pad. The northern part of the site predominantly consists of an open grassed area.

Current land use in the vicinity of the site is primarily residential, with a City of Hamilton Central Services Building at 125 Caroline Street North to the north of the site, and an EMS Building at 177 Bay Street North to the northeast of the site. Each of these properties are also owned by the City, but are not considered to be part of the "site" for this investigation.

The site is municipally serviced with water from a municipal drinking water system derived from Lake Ontario. Wastewater from the splash pad is discharged via catch basins into the sewer system which crosses the site.

1.2 Current and Proposed Future Uses

The site is currently used as a park, and is located within an area of the City of Hamilton zoned as a P1 neighbourhood park zone (as per Zoning By-Law Number 05-200, as amended). Future land use of the site is anticipated to remain as such. Filing a record of site condition (RSC) is required if the land use at a site is changed to a more sensitive use, however, as the use of the site is expected to remain unchanged, an RSC will not be required.

1.3 Applicable Site Condition Standards

1.3.1 Soil and Groundwater

Site condition standards for use at this site were selected from the Ontario Ministry of the Environment Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act using the approach described by O. Reg. 153/04, as amended. The following site specific information was used to select the standards for the site:

- The site is not an environmentally sensitive area as defined by Section 41 of O. Reg. 153/04 since:
  - The site is not, does not include, is not adjacent to, and is not part of an area of natural significance, nor does it include land that is within 30 m of an area of natural significance;
  - Soil at the site has pH values within the 5 to 9 range, and 5 to 11 range for subsurface soil;

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- The site is not considered a shallow soil property since more than 2 m of overburden is present; and,
- The site does not include nor is it adjacent to a water body, nor does it include land that is within 30 m of a water body.

- The stratified depth restoration option has been selected;
- Restoration of groundwater to potable levels is not required as the site, and all other properties located, in whole or in part, within 500 metres of the boundaries of the site, are supplied by a municipal drinking-water system which obtains water from Lake Ontario.
- The property land use at the site is parkland and it is expected to remain as such, thus the residential/parkland/institutional site condition standards were applied;
- Overburden at the site comprised predominantly silty sand fill interspersed with waste materials and debris including brick debris, asphalt fragments, glass, wood, black aggregate, ash, and tar like residue. This fill was generally underlain by a silty sand unit that is subsequently underlain by silty clay,
- Results of grain size analysis, excluding material greater than 2 mm diameter (in accordance with O. Reg 153/04), identified the presence of both coarse and medium/fine textured soil at the site, (Appendix A) and it is estimated that more than 1/3 of soil at the site, measured by volume, is considered to be coarse textured.

Based on the above information, site condition standards selected for use at this site correspond to the stratified standards for coarse textured soil and residential/parkland/ institutional land use in a non-potable groundwater condition (i.e. Table 5, MOE, 2011a).

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2 Background Information

2.1 Physical Setting

The site is located northwest of the intersection of Cannon Street West and Bay Street North (Figure 1). The site has an irregular shape, measuring approximately 26,250 m^2 (2.6 ha) in area, and consists of open grassed areas with some paved pedestrian pathways. As described previously, a baseball diamond, tennis courts, basketball courts, a playground and splash pad, and a maintenance building are present at the site with the majority of the site consisting of open grassed areas.

The topography of the site suggests the features of a partially filled ravine as the eastern and western portions of the site slopes down towards the centre, and there is an overall decrease in elevation across the site from south to north. The regional direction of local shallow groundwater flow is towards Hamilton Harbour (Lake Ontario), located approximately 600 m north of the site. The regional overburden geology comprises predominantly sand, gravelly sand and gravel, underlain by shale, limestone, dolostone or siltstone bedrock.

Surface drainage infiltrates through the grassed ground surface or is directed to one of several catch basins connected to the sewer system that are located throughout the park.

A Phase I ESA conducted by SNC-Lavalin for the site (detailed further below) identified that the block from Bay Street North to Caroline Street North and from Cannon Street West to Stuart Street was historically predominantly a ravine except at the northwest corner of Mulberry Street and Bay Street North (based on an 1873 Birds Eye View Map). In the Bird's Eye View map dated 1893, the ravine is partially filled and based on site topography has been further infilled in the intervening period. No information was available with regards to the quality of the fill material.

2.2 Previous Investigations

Several environmental investigations have been completed at the Site between 1993 and 2018, as outlined below.

In 2013, a Phase I ESA was completed for the Phase II ESA site (SNC-Lavalin, 2013). The report was completed in accordance with O.Reg. 153/04 and was signed by a Qualified Person (QP) as defined by O. Reg. 153/04, as amended. This report was updated in 2018 to incorporate responses to Freedom of Information (FOI) requests submitted to the Ministry of the Environment, Conservation and Parks (MECP) related to adjacent properties.

The Phase I ESA identified that from 1893 to the late 1970s, the site and adjacent properties were developed into a mix of residential, commercial and industrial uses. What is now Central Park, is an assemblage of several properties which, during this period was occupied by Mulberry and Caroline Streets as well as industrial use properties conducting various activities. Activities with the potential to result in impact to soil and groundwater quality at the site included:

- A closed landfill that received municipal and domestic waste (active prior to 1970);
- A coal tar distillation and potential coal gasification plant (operated by Currie Products Limited from the 1920s to 1979);
- Various scrap metal yards (operated approximately between the 1920s and 1980);

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- A metal plating company (operated between the 1920s to the 1970s);
- An auto repair garage (operated during the 1940s);
- An industrial rail spur;
- Other miscellaneous manufacturing (Leather Carthage from the 1920s to the 1970s, and Hamilton Cold Storage Ice Making and Ware Food Limited from the late 1800s to the 1960s);
- Former potential fuel oil underground storage tanks (USTs) and above-ground storage tanks (ASTs); and,
- Infilling with soil material of unknown quality.

Several activities with potential to impact soil and groundwater quality were also identified on adjacent or neighbouring properties (within 250 m of the site) including former and active gasoline and fuel oil USTs and ASTs, a former polychlorinated biphenyl (PCB) storage facility, a former coal gasification plant, various generators of hazardous wastes including an auto repair shop, a manufacturer of abrasive products, an former elevator manufacturing company and a former asbestos packing company. These activities are listed in detail in the Phase I ESA (SNC-Lavalin, 2018).

Potential contaminants of concern (COCs) that relate to both on and off-site potentially contaminating activities include: metals, volatile organic compounds (VOCs), petroleum hydrocarbons (PHC) fractions F1-F4, polycyclic aromatic hydrocarbons (PAHs), and PCBs.

No historical records were found for the site that predate 1850. According to the Map of the City in the County of Wentworth Canada West (Marcus Smith Map) obtained from McMaster University library, one building was already present in the southeast corner of the site in 1850-1851, which appears to be of commercial or industrial use. As indicated above, the Bird's Eye View map dated 1873 indicated the block from Bay Street North to Caroline Street North and from Cannon Street West to Stuart Street was predominantly a ravine except at the northwest corner of Mulberry Street and Bay Street North where additional buildings of commercial or industrial uses are noted. Buildings are also noted on the west side of Bay Street North. In the Bird's Eye View map dated 1893, the ravine is partially filled but the site is still vacant, with the exception of the single building noted above. No information was available with regard to the source or quality of the fill material used to infill the ravine. From 1893 to the late 1970s, additional infilling of the ravine occurred and the area developed into a mix of residential, commercial and industrial property uses.

The Phase I included a review of all previous investigations conducted at or in the vicinity of the site to date. A brief summary is provided below:

- MOE Memorandum (1993): documented a site clean-up by the City in the vicinity of former Currie Products Ltd. in 1979. During the remediation, liquid and semi-solid waste including naphthalene, tar residue and diesel fuel oil were disposed of off-site.
- City of Hamilton Public Works Memorandum (1994): indicated that impacted soil was encountered during construction in preparation of a new play structure. The City retained Golder Associates Ltd. to collect one sample from the excavation. Laboratory analysis identified exceedances of MECP residential/parkland land use guidelines for arsenic, total petroleum hydrocarbons (TPH), benzene, ethylbenzene, PAHs and oil and grease.
- Golder Associates Ltd., Environmental Testing (1994): advancement of seven boreholes in the vicinity of the current playground equipment (in the northern portion of the site only) to depths from 1.8 m to 11.6 m below ground surface. The findings were as follows:

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  - The upper limit of fill was encountered within 0.2 m of ground surface at each borehole and ranged in thickness between 2.9 m and 11 m;
  - Staining and deleterious materials, including black slag, brick, glass fragments, ash and tar residue were observed in the fill;
  - Free water was noted in four (4) boreholes, ranging from approximately 3.0 m to 4.5 m below surface; and,
  - Exceedances of selected guideline criteria for one or more of ethylbenzene, xylenes, PHC F3, and individual PAHs and metals were noted.

- Stantec Consulting, Environmental Review: Hamilton West Harbour Planning Area (2003): indicated that the area around the Site was developed in the early 1800s. Bird's Eye View maps of Hamilton from 1876 and 1893 indicated the area to be an undeveloped gully or ravine. The 1964 insurance plan identified Currie Products Ltd., a coal tar distillation plant, immediately south of Sheaffe Street, activities at which may have impacted soil and groundwater quality. Stantec also referenced the presence of a closed landfill (impacts from which are not known), containing municipal or domestic waste, near Sheaffe Street and Bay Street North. Other potential environmental concerns identified related to storage of PCBs; impacts from metals and other parameters from historical metal operations; the storage, use and generation of paints, petroleum, aromatic solvents and other wastes at the Central Services property; and several smaller industries that include metal working, packing materials, heating and cooling equipment, paper goods, auto repair, scrap yard and materials storage. The report stated that "asbestos was indicated at a former packing company in this section. Any asbestos that may be present in the soil would represent an environmental concern".
- Amec Limited, Phase I Environmental Site Assessment (2006): identified the presence of several auto repairs and gasoline service stations within 150 m north of the Site.
- Jagger Hims Ltd., Phase I Environmental Site Assessment (2007): indicated that the area in the vicinity of Central Park has been of residential and industrial use since prior to 1900. Notably, leather tanning was conducted at a property west of Central Park on Hess Street from 1911 to the 1970s.
- AECOM Canada Ltd., Groundwater Sampling and Analysis (2009): groundwater sampling and analysis conducted on the property located at 128 Barton Street West (approximately 150 m north of the Site) identified soil and groundwater impacts in the southern and western parts of the property. The groundwater sample collected from a monitoring well near the south property boundary contained PHC Fraction F1 and F2 concentrations in excess of the selected MECP Table 2 Standard. Note that MECP Table 2 (potable groundwater conditions) standards were used because there are no standards prescribed for PHC fractions F1 to F4 in the MECP Table 3 Standards (non-potable groundwater condition). Based on AECOM report and the subsequent Phase II ESAs completed on the property, metals concentrations above the MECP Table 3 Standards were detected in the fill material (sand and gravel) and/or the native silty sand extending from the surface to an approximate depth of 2.0 meters below ground surface (m bgs). PAH impacts were detected at depths between 3.7 m and 7.3 m bgs.
- MCR Phase I Environmental Site Assessment (2009): indicated that historical and current industrial activities at 125 Barton Street West and surrounding properties (including the former coal tar manufacturer located 50 m south of the Site) could pose an environmental concern. The on-site activities mentioned in this report were similar to the ones identified by Stantec.
- Multiview Locaters EM31 Survey (2013): In response to MECP concerns regarding the possible presence of a buried rail car in the northeast portion of the park ground penetrating radar (GPR) survey using an EM31 meter was conducted by Multiview Locaters on behalf of Azimuth Environmental Consulting Inc., at the Site in January 2013 that measured apparent and in-phase conductivity of the soil. The findings identified several metallic buried objects, including one that had

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dimensions comparable to that of a rail car. No other information was available at the time to confirm the presence of the rail car, or its contents.

- Azimuth Environmental Consulting Inc., Soil Investigation (2013): included advancement of seven boreholes to a depth of approximately 2 m bgs, with the exception of borehole BH-3 which was terminated due to auger refusal at 1.2 m bgs. In summary, the results of the investigation were as follows:
    - The Site stratigraphy comprised a thin topsoil layer covering demolition debris of the former industrial area;
    - Asphaltic residue and tar flecks were identified within the fill to the limit of the investigation;
    - Exceedances of various MECP Table 3 standards were noted throughout the investigated area for metals, PAHs, and PHC F2 and F3;
    - Results from a composite topsoil sample exceeded select MECP Table 3 Standards for mercury and some PAHs;
    - Material identified as “free phase product” was reported in BH-3. Auger refusal was met at a depth of 1.2 m bgs and a sample was not able to be collected. Black, wet to saturated sands were also observed at shallow probe holes L-5-2, L-5-3 and L-5-4; however, samples were not collected at these locations;
    - The results of the investigation program identified impacts within the upper 2 m of overburden when compared to MECP Table 3 Standards. It should be noted that exceedances were identified at each borehole advanced at the property at both near surface (<1 m) and slightly deeper (1 m to 2 m) intervals. The investigation did not delineate the extent of either lateral or vertical impacts;
    - Borehole BH-2 was advanced to a depth of 2 m bgs to investigate the presence of a metallic anomaly. No further clarification of the anomaly resulted as the borehole did not meet refusal, and the presence/absence of the rail car (identified by the MECP as possibly being in this location) was unconfirmed; and,
    - Groundwater was not encountered during the investigation.
- SNC-Lavalin Inc., Supplemental Phase II ESA (2018)
    - Field work activities were completed over a multi-year period, between September 2014, and September 2016.
    - The work program consisted of drilling 22 boreholes (BH-101 to BH-117, and MW-201 to MW-205) and completing 11 as monitoring wells (BH-101 to BH-104, BH-115, BH-116 and MW-201 to MW-205) and the excavation of two test pits.
    - Overburden material investigated at the site comprised predominantly silty sand, fill with waste materials/debris (bricks, glass, wood, black slag, white ash, tar residue etc.) underlain by silty sand, subsequently underlain by silty clay and clay with silt. Intermittent black tar-like deposits were observed intermixed with debris within and in the vicinity of test pit TP-1 at depths ranging from 1.7 to 2.0 m bgs. A viscous black, oily liquid was observed on augers during the drilling of MW-204 at a depth of approximately 4.6 to 7.9 m below grade, and significant naphthalene odour was observed during drilling of MW-202 at approximately 3 m below grade.
    - The test pit (TP-1) excavated to investigate a large magnetic anomaly confirmed the presence of a large, concrete foundation with extensive reinforcing bars. During the excavation of TP-2 shallow groundwater inflow made observation of soil conditions and collection of samples challenging, preventing the identification of tar-like products or other specific debris/contaminant sources.

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- Grain size analyses determined soil texture at the site to be predominantly coarse textured; however, a fine textured sample was collected in silty sand fill found at depths varying from 0 to 2 m bgs. Site soils were therefore classified as coarse textured since it is inferred that at least 1/3 of the soil at the site, measured by volume, consists of soil that is considered coarse. The site condition standards selected for use at the site correspond to the stratified depth site condition standards for coarse textured soil and residential/parkland/institutional land use in a non-potable groundwater condition (i.e., Table 5: Stratified Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition; MOE, 2011a).
- Concentrations of one or more of benzene, ethylbenzene, xylenes, PHC F1, F2, F3, PAHS (including acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene) and/or metals and inorganics (including antimony, arsenic, barium, hot water soluble boron, cadmium, copper, lead, mercury, selenium, zinc and electrical conductivity) exceeded the selected MECP Table 5 standards in one or more soil samples collected from boreholes and test pits in surface and/or sub-surface soil. Concentrations of PCBs satisfied the selected MECP Table 3 standards in all analysed soil samples.
- The inferred shallow groundwater direction is interpreted to be towards the north, with local shallow groundwater flow in the northern portion of the site interpreted as being influenced by a retaining wall that that is present along the north edge of the site between the north edges of Sheaffe Street and Caroline Street North. The groundwater flow direction inferred in the deeper screened wells was generally consistent with the shallow flow direction, however, the measured depth to water in one well (MW-203) suggested a southeastern component. As this was based on a single well on a single event, a possible southeast flow direction should be further investigated and evaluated to confirm.
- NAPL was not detected by the interface probe during groundwater monitoring although sheen was observed on water purged from monitoring well MW-104 during monitoring well development. However, during one or more monitoring events, the water level was above the screened interval of the monitoring well, which could preclude the identification/capture of LNAPL, if present.
- Concentrations of one (1) or more of benzene, PHC F2, PHC F3, and PAHs (acenaphthylene, anthracene, benzo(g,h,i)perylene and naphthalene) exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-101, MW-104, MW-115 and MW-116. Concentrations of these parameters in groundwater samples collected from deep monitoring wells MW-201 to MW-205 did not exceed the applicable Table 5 standards (after some of these wells were redeveloped to reduce sediment entrainment). Concentrations of metals and inorganic parameters and PCBs, where analysed, were less than MECP Table 5 standards.

› Englobe Soils Materials Environment (Englobe), 2018 : Railway Street Reconstruction Geotechnical Investigation :

- The Englobe project site included the majority of Railway Street, adjacent to Central park as well as a portion along the northern extent of Railway Street, on site.
- In general, the subsurface stratigraphy contacted at the site comprised a pavement structure overlying fill, and native deposits of sand and silt.

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- Laboratory chemical analyses were performed on selected soil samples representing material considered likely to be excavated or removed as part of the construction to assess preliminary waste disposal requirements.
- Antimony was detected at a concentration exceeding the Table 1 standards in soil sampled within the northern portion of the project site (i.e. park area).
- Toxicity Characteristic Leachate Procedure (TCLP) analysis of soil sampled from the municipal road corridor reported assessed parameters that meet the Ontario Regulation (O.Reg.) 347 Schedule 4 criteria. As such, the analyzed fill materials within the municipal road corridor may be characterized as non-hazardous waste for disposal purposes.

› Englobe Soils Materials Environment (Englobe), 2018 : Caroline Street North Reconstruction Geotechnical Investigation :

- In general, the subsurface stratigraphy beneath roadway flexible pavement structure in places, comprised fill and native deposits of sand and silt.
- Stabilized groundwater was measured at Boreholes BH-09-17, BH-17-17 and BH-18-17 at depths of 1.6, 3.7 and 2.6 m, respectively. As such, it is anticipated that proposed sewer reconstruction excavations in future may have to extend 2 m or further into groundwater.
- Soil was sampled from four boreholes advanced in Central Park for chemical analysis of selected parameters in support of an on-going environmental risk assessment. One or more PHCs, VOCs, PAHs, metals and inorganic parameters were detected at concentrations exceeding the Table 3 standards in soil sampled from the central portion of the project site (park area). One or more PHC, PAH, metals and inorganic parameters were also detected above the MOECC (2011) Table 3 SCS in the northern and southern portions of the project site (Caroline Street North corridor).
- TCLP analysis of soil sampled from the park area showed that lead was reported at a concentration exceeding the O.Reg. 347 Schedule 4 criteria. As such, the analyzed soil within the park portion of the current work area may be considered as hazardous waste for disposal purposes.

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3 Scope of Investigation

3.1 Overview of Site Investigation

The objectives of this work program was to further characterize the soil and groundwater conditions at the site to prepare a baseline data set and Conceptual Site Model (CSM) to complete a human and ecological risk assessment in order to develop risk management measures (RMM) to be implemented during park redevelopment to mitigate identified risks.

The work program for the subsurface investigation included the following tasks:

- Clearing proposed subsurface investigation locations of underground utilities prior to field program;
- Drilling and soil sampling of 30 boreholes at various locations across the site identified in the attached Sampling and Analysis Plan (SAP) matrix (Appendix B);
- Completing 17 of the boreholes as monitoring wells as identified in the SAP;
- Completing four of the boreholes as soil vapour probes at locations identified in the SAP;
- Collection of shallow surface soil samples in the vicinity of mature trees along the property perimeter at locations identified in the SAP;
- Developing and purging newly installed monitoring wells prior to groundwater sampling;
- Completing one groundwater sampling round on new and existing monitoring wells;
- Monitoring all monitoring wells for depth to groundwater, presence or absence of light or dense non-aqueous phase liquid (LNAPL or DNAPL), monitoring well headspace organic and combustible vapour prior to sampling;
- Completing purging and leak testing on soil vapour probes prior to collection of field screening parameters and samples.
- Collecting soil vapour samples using a Summa Canisters.
- Authorizing laboratory analysis of soil, soil vapour and groundwater samples
- Implementing Quality assurance and quality control (QA/QC) protocols including field duplicate samples of all parameters.
- Compiling the field observations and analytical results.

3.2 Media Investigated

During the field investigation soil, soil vapour and groundwater samples were collected. No sediment or surface water is present at the site and accordingly, they were not sampled.

3.2.1 Overview of the Field Investigation

3.2.1.1 Soil

The soil investigation conducted by SNC-Lavalin included the following activities:

- Drilling 30 boreholes;
- Collecting soil samples at various depths of concern from the boreholes, for laboratory analysis of one or more of VOCs, PHC fractions F1 to F4, PAHs, O. Reg. 153 metals and inorganics, PCBs, FOC, pH and grain size. The soil sampling program detailed in the sampling and analysis plan identified the proposed number and depth of samples to be collected from each borehole; and,
- Collecting and submitting one composite representative soil sample for waste classification analysis.

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3.2.1.2 Groundwater

The groundwater investigation conducted by SNC-Lavalin included the following activities:

- Completing 17 of the 30 boreholes as monitoring wells;
- Monitoring headspace vapour readings, measured water levels, and inspecting the newly installed monitoring wells for the presence or absence of light non-aqueous phase liquids (LNAPL); and,
- Well development and collection of groundwater samples from the 17 newly installed monitoring wells for laboratory analyses of one or more of VOCs, PHC F1 to F4, PAHs, metals and inorganics and/or PCBs
- Collection of groundwater samples from 15 existing monitoring wells.

3.2.1.3 Soil Vapour

The soil vapour investigation conducted by SNC-Lavalin included the following activities:

- Completing four of the 30 boreholes as soil vapour probes;
- Soil vapour probe development, leak testing and collection of soil vapour samples from the four newly installed soil vapour probes for laboratory analyses of VOCs and naphthalene

In addition to the activities listed above, SNC-Lavalin also:

- Completed geodetic elevation surveys of newly installed monitoring wells, and update existing borehole and monitoring well elevations according to geodetic survey;
- Implemented a Quality Assurance and Quality Control (QA/QC program); and,
- Disposed of wastes generated during the investigation (purge water and fluids from equipment cleaning).

3.3 Phase I Conceptual Site Model

A CSM was originally developed for the site as part of the Phase I ESA and is described in the following paragraphs, including the identified Areas of Potential Environmental Concern (APECs) and Potentially Contaminating Activities (PCAs) as shown on Figures 3 and 4.

The topography in the site represents the features consistent with a partially filled ravine, western portion of the site slopes to the east and the eastern portion of the site slopes to the west and overall the site has a gradient towards the north, towards Lake Ontario, located approximately 600 m north of the site. Based on available data, the general direction of shallow groundwater flow is north towards Lake Ontario. The regional overburden geology, as interpreted by Map 2556 (Barnett et. al, 1991) and Map 2544 (OGS, 1991), comprises predominantly sand, gravelly sand and gravel, underlain by shale, limestone, dolostone or siltstone bedrock.

The site is serviced with water from a municipal drinking-water system derived from Lake Ontario. The on-site subsurface utilities included water, electrical, storm/sanitary sewer. In addition, underground electrical lines are present which travel to a large transformer in the southern portion of the site. Shallow groundwater flow and contaminant transport may be influenced by the presence of subsurface utility corridors and/or fill materials.

APECs and associated potential COCs identified by the Phase I ESA are included in the following table.

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APEC	Location of Potential Environmental Concern on the Phase I Property	Potential Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (groundwater, soil and/or sediment)
APEC #1	Entire site	30 – Importation of Fill of Unknown Quality	On-site	Metals, VOCs, PAHs, and PHCs	Soil and groundwater
APEC #2	Northern portion of site (in vicinity of former Caroline Street)	46 – Rail Yards, Tracks and Spurs	On-site	Metals, VOCs, PAHs, and PHCs	Soil and groundwater
APEC #3	Northern portion of the site (Currie Products, historically located to the east of former Caroline Street and south of former Sheafe Street)	9 – Coal Gasification	On-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater
APEC #4	Northern portion of the site (Currie Products, historically located at the southeast corner of Caroline and Sheafe)	5 – Asphalt and Bitumen Manufacturing	On-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater
APEC #5	Central portion of the site (United Gas and Fuel Company, historically located at the southeast corner of Caroline and Mulberry)	9 – Coal Gasification	On-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater

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APEC	Location of Potential Environmental Concern on the Phase I Property	Potential Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (groundwater, soil and/or sediment)
APEC #6	Western portion of the site (metal plating facility, historically located at the southwest corner of Caroline and Harriet)	34 – Metal Fabrication	On-site	Metals, VOCs, PAHs, and PHCs	Soil and groundwater
APEC #7	Northwestern portion of the site (historical junk yard identified near the northwest corner of Caroline and Harriet)	49 - Salvage Yard, including automobile wrecking	On-site	Metals, VOCs, PAHs, PHCs, and PCBs	Soil and groundwater
APEC #8	Southwestern portion of the site (historical junk yard identified near the southwest corner of Caroline and Mill)	49 - Salvage Yard, including automobile wrecking	On-site	Metals, VOCs, PAHs, PHCs, and PCBs	Soil and groundwater
APEC #9	Southern portion of the site (historical junk yards identified at the northeast corner of Caroline and Cannon)	49 - Salvage Yard, including automobile wrecking	On-site	Metals, VOCs, PAHs, PHCs, and PCBs	Soil and groundwater

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APEC	Location of Potential Environmental Concern on the Phase I Property	Potential Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (groundwater, soil and/or sediment)
APEC #10	Central portion of the site (historical junk yard identified at the southwest corner of Railway and Mulberry)	49 - Salvage Yard, including automobile wrecking	On-site	Metals, VOCs, PAHs, PHCs, and PCBs	Soil and groundwater
APEC #11	Eastern portion of the site (historical garage/truck maintenance facility located in to the east of the existing tennis courts)	27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	On-site	Metals, VOCs, PAHs and PHCs,	Soil and groundwater
APEC #12	Eastern portion of the site (landfill reportedly present to the south of the existing EMS Building)	58 – Waste Disposal and Waste Management	On-site	Metals, VOCs, PAHs, PHCs, and PCBs	Soil and groundwater
APEC #13	Southern portion of the site (Crescent Oil, historically located at the southeast corner of Mulberry and Caroline)	28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	Metals, VOCs, PAHs and PHCs,	Soil and groundwater
APEC #14	Northern portion of the site (potential presence of a buried rail car)	N/A	On-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater

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APEC	Location of Potential Environmental Concern on the Phase I Property	Potential Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (groundwater, soil and/or sediment)
APEC #15	Southern portion of the site (Crescent Oil currently located at 136 Cannon Street West and suspected UST at residence located at 31 Railway)	28 – Gasoline and Associated Products Storage in Fixed Tanks (Crescent Oil currently located at 136 Cannon Street W, and suspected UST at residence located at 31 Railway) 34 – Metal Fabrication (Boman Bronze Co Moulding historically located at 26 Railway)	Off-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater
APEC #16	Eastern portion of the site (Coal gasification historically located at 160 Bay Street N and 100 Mulberry, and 25,000 L UST at 160 Bay Street N	9 – Coal gasification (historically located at 160 Bay Street North and 100 Mulberry), and 28 - Gasoline and Associated Products Storage in Fixed Tanks (25,000 L fuel UST at 160 Bay Street N)	Off-site	Metals, VOCs, PAHs, PHCs	Soil and groundwater

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APEC	Location of Potential Environmental Concern on the Phase I Property	Potential Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (groundwater, soil and/or sediment)
APEC #17	Northern portion of the site (125 Barton historically occupied by Hamilton Bridge and Tank Co Ltd, materials and transformers, and subsequent PCB storage site)	55 - Transformer Manufacturing, Processing and Use (located at 125 Barton, historically occupied by Hamilton Bridge and Tank Co Ltd (materials and transformers). Subsequently utilized as a PCB storage site.	Off-site	Metals, VOCs, PHCs, PAHs and PCBs.	Soil and groundwater

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4 INVESTIGATION METHOD

4.1 General

A site specific health and safety program was implemented by SNC-Lavalin throughout the work program.

The Phase II ESA program was completed by SNC-Lavalin field staff using field and laboratory analysis protocols based on O. Reg. 153/04 and POPs described in the SNC-Lavalin Field Work Guidance Manual.

Utilities in the work area were cleared by various public utility companies at the request of SNC Lavalin. In addition, OnSite Locates (OnSite) of Newmarket, Ontario, a private utility locating company, was retained by SNC-Lavalin to mark and clear all private utilities and to confirm the locations of public utilities. Drilling locations were finalized based on the location of infrastructure and utilities.

4.2 Drilling

Landshark Drilling (Landshark) of Burford, Ontario was retained by SNC-Lavalin to drill 30 boreholes (BH 18-01 to BH 18-30) at the site between August 28, 2018 and September 17, 2018, under the supervision of SNC-Lavalin staff. Drilling was conducted using a two drilling rigs, a track-mounted B-57 and a truck mounted B-57 drill rig, each equipped with hollow stem augers and split spoon samplers. Depth of boreholes ranged between 1.5 m bgs to 17.4 m bgs.

Borehole and monitoring well locations are shown in Figure 5. Borehole logs are provided in Appendix B.

Soil samples were collected during drilling using 5.1 cm O.D., 61 cm long split spoon samplers that were advanced ahead of the augers. The sequence of drilling was planned to assess areas that were suspected to be less impacted first, and proceeding to the areas suspected of having greater impacts. Sampling equipment was decontaminated between successive samples and drilling locations with a detergent (Liquinox) and water. For visibly impacted soil sampling locations, augers were washed using high pressure water following drilling activities within a large tub. Water used to decontaminate the augers was contained in 205 L drums along with purged groundwater for off-site disposal in accordance with O. Reg. 347.

4.2.1 Subsurface Soil Sampling

- Potential COCs - A minimum of two (2) soil samples from each borehole location were submitted for laboratory analysis of VOCs, PHC F1 to F4, PAHs, PCBs and metals/inorganics. Samples were selected to identify worst case soil conditions (i.e. highest OVM readings, staining, etc.) and to vertically delineate potential impacts, where possible.
- Waste Classification - One (1) composite sample (TCLP-1) from the worst case soil conditions was submitted for waste classification including toxicity characteristic leaching procedure (TCLP) inorganics, TCLP benzene, TCLP benzo(a)pyrene, TCLP PCBs, bulk PCBs and ignitability.
- Grain Size – Four representative soil samples were submitted for grain size analysis.
- Sampling points: Sample locations are described in the SAP attached as Appendix B.

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4.2.2 Field Screening Measurements:

Soil samples used for field logging/screening were placed in sealable plastic bags and logged in the field for soil type, moisture content, colour, structure, texture and visual evidence of impact. Maximum headspace vapour readings in the sample bags were measured using a RKI Eagle 2 organic vapour meter (OVM) set to record combustible vapour operated in methane elimination mode and photoionization detector (PID) to record volatile organic vapour. The OVM and PID were calibrated by the supplier (Maxim Environmental of Mississauga).

Field screening with the OVM was used to qualitatively identify potential "worst case" samples for laboratory submission for identifying the potential presence of contaminants with relatively elevated vapour readings (e.g. VOCs/F1 PHC). Non-volatile parameters (e.g. heavy metals and some heavy organic compounds) cannot be screened using this approach. In addition to field screening with the OVM, potential worst case sample selection was based on visible observation of the sample (staining), site geology/hydrogeology and knowledge of contaminant behaviour.

4.2.3 Shallow Soil Sampling:

- Surficial soil samples were collected from near surface depth at 18 locations along the periphery of the Site.
- Surficial soil samples were collected using a handheld trowel or spade from depths between 0.0 m to 0.2 m bgs and analyzed for metals and select inorganics.
- Surficial soil samples were selected to represent surficial soil quality in the vicinity of the property boundary and nearby mature trees, to develop information that may be used during mitigation measure design and implementation. Specifically it was intended that this data would allow a determination as to whether it may be possible to retain existing trees and taper a surface soil cap in the event that this is the recommended mitigation method.

4.3 Groundwater

The groundwater SAP included the following:

- Instrumenting selected boreholes as monitoring wells;
- The groundwater monitoring well locations were selected to target suspected worst case groundwater conditions by installing monitoring wells screened in known areas of soil impact;
- Instrumenting monitoring wells with screened intervals of 3.1 m in length;
- Monitoring the depth to water on at least one occasion following installation; and,
- Collecting groundwater samples from each well on at least one occasion and submitting samples for all PCOC identified for the APEC in which the well was installed.

4.3.1 Monitoring Well Installation and Development

Nineteen boreholes BH18-01 to BH18-05, BH18-07 to BH18-09, BH18-14, BH18-16, BH18-17 and BH18-23 to BH18-30 were instrumented with monitoring wells and were designated as monitoring wells, MW18-01 to MW 18-05, MW 18-07 to MW 18-09, MW 18-14, MW 18-16, MW 18-17 and MW 18-23 to MW 18-30 respectively. The monitoring wells were installed to investigate hydrogeological conditions and to allow groundwater monitoring and sampling.

Due to the significant variations in surface elevation across the site, the monitoring well screens were installed at varying depths ranging between 2.0 m to 17.25 m bgs. The screened intervals were

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referenced to geodetic elevations ranging between 91.65 m asl to 76.09 m asl. The monitoring wells were constructed of 51 mm PVC screens and risers. A clean silica sand pack was placed around each screen and isolated with bentonite to slightly below grade. The wells were completed with flush mount protective steel casings set in concrete and lockable j-plugs. Monitoring well locations are shown in Figure 5 and monitoring well construction details are presented in the borehole logs (Appendix C).

In accordance with O. Reg. 903, as amended, monitoring wells completed as part of this investigation were registered as a cluster under MECP. Copies of the well records are provided in Appendix C.

The monitoring wells were equipped with dedicated sampling equipment including low density polyethylene (LDPE) tubing and inertial foot valves.

To minimize the potential for cross-contamination during well installation, well supplies (including, screen, riser and dedicated LDPE tubing) were removed from protective packaging only immediately prior to use and were handled by workers wearing a new pair of disposable nitrile gloves per well, avoiding contact with potentially contaminating materials.

Following installation, monitoring wells were developed by purging approximately three borehole volumes of water (calculated as the volume of standing water in well riser plus the volume of water in the sand pack surrounding the well screen) or three times dry. To assess the effectiveness of well development during purging, pH, conductivity and temperature readings were measured using a Hanna Instruments HI 991300 meter calibrated by Maxim Environmental and Safety Inc. (Maxim) prior to each monitoring and sampling event. Purging was considered complete when field parameter readings stabilized (within 10%) and, if possible, when purged water was visibly clear of sediment/turbidity. The date of the well development, the time, the purged groundwater volume and the field parameter measurements were recorded in the field log.

4.3.2 Hydraulic Conductivity Testing

Hydraulic conductivity testing was carried out on four newly installed monitoring wells (MW18-02, MW18-04, MW18-14 and MW18-16) following monitoring well development on September 12 and 13, 2018.

Each hydraulic conductivity test was carried out by establishing a static water level measurement followed by a semi-instantaneous removal of a slug of groundwater from the monitoring well to induce a groundwater level drawdown. The maximum water level displacement was recorded and the water level response was measured in the monitoring well at timed intervals until approximately 80% of the drawdown had recovered. The measurements were recorded and analysed to estimate the aquifer hydraulic conductivity.

4.3.3 Field Measurement of Water Quality Parameters

Monitoring of the newly installed wells was conducted following installation. Both pre-existing and newly installed monitoring wells had depth to groundwater level and depth to the base of the well measurements obtained from the top of the riser. The presence or absence of free phase product floating and/or accumulating at the base of the well was assessed, and headspace vapour readings from the riser were obtained. This work was completed between September 7 to 13, 2018 and from September 24 to 28, 2018. Several attempts were made to locate MW-204 referencing site landmarks and features as well as use of a magnetic pin finder, however, this monitoring well could not be located in the field and is considered destroyed.

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Depth to groundwater and/or free phase NAPL were measured relative to the top of riser pipe using a Heron Instrument H, Oil Interface meter. Prior to use in each well, the interface probe was decontaminated using Liquinox and rinsed with distilled water to minimize the potential for cross-contamination.

Headspace vapour readings in each monitoring well were measured with either Gastech 1238ME OVM or RKI Eagle 2 operated in methane elimination mode upon the removal of the well cap.

4.3.4 Groundwater Sampling

Existing and newly installed monitoring wells were sampled between September 7 to 28, 2018 using new, dedicated, low density polyethylene tubing (LDPE) and silicone tubing connected to a peristaltic pump, and for select, deeper monitoring wells LDPE tubing connected to a bladder pump. To prevent loss of volatiles during sampling, at monitoring wells where a peristaltic pump was used VOC and PAH samples were collected with disposable, single use LDPE and inertial foot valves using the “straw” method. The low flow sampling methodology was utilized to limit the potential for sediment entrainment into samples, to allow for minimal disturbance in the water column and to minimize the volume of purged water requiring disposal.

Groundwater samples were collected from all monitoring wells, except MW-204, and submitted for laboratory analyses of VOCs, PHC F1 to F4, PAHs, metals/inorganics and PCBs according to the SAP indicated in Appendix B.

Samples were collected in pre-labelled, laboratory supplied sampling containers that were pre-charged with laboratory supplied preservatives. Samples submitted for metals analysis were field filtered using in-line filters. Following sample collection, samples were stored in ice filled coolers pending shipment to the laboratory under full chain of custody procedures.

Field investigations were carried out in general accordance with O. Reg. 153/04, as amended, preferred operating procedures (POPs) described in the SNC Lavalin Field Work Guidance Manual and a quality assurance and quality control (QA/QC) program.

4.4 Soil Vapour

To assess potential soil vapour risk to adjacent properties, soil vapor probes were installed in boreholes BH18-19 to BH18-23 along the property boundary at three locations (SVP18-01 to SV18-03) and at one suspected worst case location (SVP18-04) in the vicinity of known soil and groundwater impacts, and suspected trace product.

4.4.1 Soil Vapour Probe Construction

The soil vapour probes were installed by Landshark under SNC-Lavalin supervision. The probes were constructed of 0.152 m long, 12.7 mm O.D. AMS vapour implants with 0.15 mm slotted mesh screen attached to 6.4 mm O.D. (4.8 mm I.D.) Teflon® tubing and Swagelok® fittings at the top of tubing. A sand filter pack was placed around the screened interval, extending slightly above it. A hydrated granular bentonite seal was placed above the sand pack (in several lifts of bentonite hydrated with distilled water) to approximately 0.3 m below surface. Soil vapour probes were finished at grade with 0.15 m diameter flush-mounted protective casings set in concrete. Soil vapour probe installation details are provided in Appendix C.

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4.4.2 Soil Vapour Probe Depth and Location Rationale

Soil vapour probes SVP18-01 to SVP18-04 were completed at a depth approximately 1.5 m bgs. Soil vapour probes SVP18-01 and SVP18-02 were installed in sand and gravel fill while SVP18-03 and SVP18-04 were installed in sand fill. At these depths, the top of the probe screens are anticipated to be situated no more than 0.5 m above the capillary fringe based on the nearby seasonal high water levels identified in the table below. A capillary fringe thickness can extend as much as 1.9 m above the water table in silty clay soil (MOE, 2011b); however, given that site soils are comprised of silty clay fill, sand fill and sand and gravel fill, and were specifically noted to be installed in more granular material, the capillary fringe thickness was assumed to be similar to that of MECP generic medium to fine textured soil with a thickness of approximately 0.4 m. The rationale for the selection of soil vapour probe locations and depths are provided in the table below.

Soil Vapour Probe Locations	Rationale for Location	Contaminants of Concern[1]	Depth of Probes[2] (m bgs)	High Water Level[3] (m bgs)
SVP18-01	Near PHC F2, benzene and naphthalene impacts in soil and groundwater, at property boundary in vicinity of residential properties	PHC F2, benzene, naphthalene	1.5	2.4
SVP18-02	Near PHC F2, volatiles and naphthalene impacts in soil and groundwater, at property boundary in vicinity of residential properties	PHC F2, benzene, naphthalene	1.5	3.1
SVP18-03	Near VOC exceedance in groundwater at property boundary in vicinity of residential properties	trichloroethylene	1.5	5.3
SVP18-04	Near expected worst case PHC and PAH impact	PHCs, benzene, PAHs	1.5	2.3

[1] Volatile contaminants of concern identified in subsurface soil and/or groundwater at concentrations exceeding risk-based values for indoor air pathway (based on MECP Table 5 component values).
[2] Depth of soil vapour probe is indicated as depth from soil surface to the bottom of the probe screening interval.
[3] Based on minimum depth to water measured in September 2018 at nearby monitoring wells.

Soil vapour probes SVP18-01, SVP18-02 and SVP18-04 provide data representative of “deep probes” since they are situated in close proximity the water table. SVP18-03 is considered an intermediate probe, representative of soil vapour conditions between nearby building foundations and contaminant source. Deep probes are considered least affected by biodegradation or attenuation and as such should represent the highest concentrations of soil vapour. Vapour concentrations from deep probes are used to assess potential vapour intrusion risk for existing buildings and future development scenarios (with potential new buildings). Intermediate depth (midway between a potential receptor foundation and the

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source zone) vapour probes are used to assess vapour intrusion risk to existing buildings. If vapour concentrations from deep probes are below target levels, the vapour to indoor pathway is likely not significant (MOE, 2010).

Municipal water and sewer utilities transect the site and SVP18-01, situated in the northern part of the Site, representative of the area of lowest elevation, where these utilities exit the site boundary. It is understood that park redevelopment will include removal and replacement of selected utilities. The proposed replacement of utilities will be included consideration of the results of this soil vapour program.

The distribution and location of soil vapour probes is considered sufficient to address potential vapour associated risks due to off-gassing from contamination present in the subsurface soil (>1.5 m bgs) and in groundwater plumes. The data from these probes have been assessed for potential exceedances of risk-based values for the indoor air pathway (based on MECP Table 5 component values). In particular, to account for expected worst case conditions, SVP18-04 was located near several representative boreholes or monitoring wells with observed black staining and/or elevated soil and groundwater concentrations of the site's COCs.

4.4.3 Soil Vapour Probe Development

In preparation for development, the static pressure between each soil vapour probe and ambient air was monitored with a digital manometer to determine if there were geologic barriers to soil gas flow. A shut-in test was completed to ensure there were no leaks present in the sampling equipment train. The sampling train connects the testing equipment to the soil vapour probes and consists of a series of stainless steel pipes with Swagelok® fittings that was connected to the soil vapour probe tubing via a John Guest ® QuickConnect shut-off valve.

The shut-in test was conducted on the sampling train by isolating the sampling train from the vapour probe and then applying a significant vacuum (-100 in H_2O) using the sampling pump (operating at pre-calibrated flow rate of 200 mL/min). The pressure was monitored in the sampling train for a period of approximately five to ten minutes. During that time, if a significant drop in pressure was observed, a leak was assumed, connections were re-checked and the test was repeated. Shut-in tests were conducted prior to probe development and sampling.

Following completion of the shut in test, soil vapour probes were developed on October 22, 2018 by removing three probe volumes of air (calculated as the sand pack, probe and tubing volumes). A Gilian® GilAir 3 sampling pump, operated at flow rates of 140 mL/min to 200 mL/min, was used to develop the soil vapour probes.

4.4.4 Soil Vapour Probe Sampling

Following development of the soil vapour probes, sampling was also completed on October 22, 2018.

To confirm the absence of leaks, the static pressure and shut-in tests (described above) were repeated. Helium tracer tests were also conducted during sampling to identify potential leaks in the sampling train. For the helium tracer tests, a polyethylene container (shroud) was used to cover the entire sampling train and was filled with research grade helium. The concentration of helium gas in the shroud was monitored/adjusted during sampling to ensure that a consistent helium concentration of at least 10% volume/volume (v/v) was maintained.

In preparation for sampling, soil vapour probes were again purged of three screen volumes of air (calculated as the probe and tubing volumes). During this purging, the vapours were collected in a

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Tedlar® bag and screened for the presence of helium using an MGD-2002 multi-gas leak detector. A helium concentration of less than 1% in the collected samples is considered acceptable. If unacceptable leaks were identified, the source of leak was identified and sealed prior to sampling.

Once leak testing was accepted, soil vapour samples were collected at flow-rates of 200 mL/min in laboratory-supplied 6 L Summa™ canisters. The Summa™ canisters were connected to the soil vapour probes using laboratory-supplied Teflon® tubing and flow controllers within the helium filled shroud described above. Soil vapour samples were submitted to Maxxam Analytics Inc. (Maxxam) for Method TO-15 analysis of VOCs and naphthalene.

4.5 Analytical Testing

Laboratory analyses of soil and groundwater samples were completed by ALS Environmental, ALS Canada Ltd. (ALS) of Waterloo, Ontario. ALS is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) and by the Standards Council of Canada (SCC).

Soil vapour analysis was completed by Maxxam Analytics Inc. (Maxxam) of Mississauga, Ontario. Maxxam is also accredited by CALA and by the SCC.

4.6 Residue Management Procedures

Drill cutting soil generated during investigation activities was placed and stored in 20, 205 L steel drums at the site. The soil based investigation derived waste will be managed during the proposed site redevelopment activities in accordance with O. Reg. 347.

Liquid collected during equipment cleaning and purged groundwater generated during well development and sampling were placed/stored in 20, 205 L plastic drums at the site for off-site disposal in accordance with O. Reg. 347. At the time of preparing this report, waste pickup of these drums had not been completed.

4.7 Geodetic and Elevation Surveying

J.D. Barnes of Milton, Ontario was retained to survey locations and elevations of newly installed monitoring wells. The survey was completed on October 22, 2018.

On November 6, 2018, SNC-Lavalin carried out an elevation survey of the existing monitoring wells' benchmark elevation, relative to the geodetic survey completed by J.D. Barnes on October 22, 2018. This data was used to update pre-existing monitoring well and borehole elevations to the geodetic benchmark.

Due to movement and stockpiling of soil at the site as part of redevelopment works, MW 18-08 and MW18-09 were not accessible for survey. The location and elevations for these wells is considered approximate and is referenced from a 1 m contour interval topographic map of the Site.

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4.8 Quality Assurance and Quality Control Measures

A QA/QC program was implemented to minimize and quantify impacts introduced during sample collection, handling, shipping and analysis. As part of the QA/QC program, sampling protocols included minimizing sample handling; submitting field QA/QC samples; using dedicated sampling equipment; using sample specific identification and labelling procedures; and using chain of custody records.

4.8.1 Sample Containers, Preservation, Labelling and Handling

Soil samples submitted for laboratory analysis were collected in the field using laboratory supplied sampling containers following protocols designed to minimize the loss of volatile constituents.

Soil samples collected for analysis of VOCs and/or PHC F1 were placed directly into 40 mL vials equipped with Teflon-lined septum caps containing pre-weighed methanol. Soil samples for the remaining parameters (PHC F2 to F4, metals and inorganics, PAHs and/or pH) were collected and placed directly into 60 mL, 120 mL and/or 250 mL wide mouthed amber glass jars with Teflon-lined lids. These jars were packed so that zero headspace remained. Soil sample jars were placed in coolers and packed with ice and were shipped to ALS by courier or delivered to the lab by SNC-Lavalin personnel. Soil samples for grain size analysis were provided to ALS in 250 mL amber glass jars.

Groundwater samples submitted for laboratory analysis were also collected in laboratory supplied sampling containers following protocols designed to minimize the loss of volatile constituents.

A consistent approach to assigning sample IDs was applied to ensure proper identification of each sample and maintain continuity between multiple series of site investigations. The approach for soil sample labelling was to use a three component sample name:

- Sample prefix (i.e. BH, SS);
- Location number (i.e. BH18-01); and,
- Sequential sample number (i.e. BH18-01-2) with the sample closest to the ground surface labelled with the suffix -1, and each subsequent sample being increased by 1.

For groundwater labelling, a two component sample number was used (i.e. MW18-01). All water samples collected from the same location, over a period of time, typically have the same sample prefix and location number, with the sampling date used to differentiate between samples.

During the field work, a permanent waterproof marker was used to label the sample containers. A marker, which is free of toluene (i.e. Staedtler Lumocolor permanent marker) was used on the sample containers. Following collection, samples were placed directly into laboratory containers (with or without preservatives depending on analytical suites) and packed into coolers with ice. The requested chemical analyses for the samples were documented in the chain of custody that was placed in the cooler. Prior to shipment, signed and dated custody seals were affixed to the coolers. The coolers were then delivered to the laboratory by courier or SNC-Lavalin personnel.

4.8.2 Sample Equipment Cleaning Procedure

The non-dedicated field soil sampling equipment (e.g. hand tools, split spoon) was brushed to remove loose soil and cleaned with detergent (Liquinox) and distilled water between samples to minimize the

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potential for cross-contamination. Dedicated disposable nitrile gloves were changed between each sample.

For visibly impacted soil sampling locations, augers were washed using high pressure water following drilling activities within a large tub. Water used to decontaminate the augers was contained in a 205 L drum along with purged groundwater for off-site disposal in accordance with O. Reg. 347.

The interface probe used to collect water level measurements was washed using detergent (Liquinox) and rinsed with distilled water between monitoring wells to minimize the potential for cross-contamination.

4.8.3 Field and Laboratory QA/QC Samples

QA/QC samples collected during fieldwork included:

Parameter group	Duplicate Sample	Parent Sample
Metals and Select Organics	BH18 03-33	BH18-03-3
	BH18 06-55	BH18-06-5
	BH18 08 111	BH18-08-11
	BH18-13-44	BH18-13-4
	BH18-17-111	BH18-17-11
	BH18 18 122A	BH18 18-12A
	BH18 100 1/2	BH18-10-1/2
	BH18-30-1/22	BH18-30-1/2
	BH18 29 22	BH18-29-2
PCBs	BH18-30-33	BH18-30-3
	BH18-03-22	BH18-03-2
	BH18-03-77	BH18-03-7
PHCs and BTEX	BH18-05-55	BH18-05-5
	BH18-08-100	BH18-08-10
	BH18 14 77	BH18-14-7
	BH18-17-111	BH18-17-11
	BH18-18-122A	BH18-18-12A

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Parameter group	Duplicate Sample	Parent Sample
	BH18 26 188	BH18-26-18
	BH18-29-33	BH18-29-3
	BH18-30-55	BH18-30-5
VOCs	BH18-03-77	BH18-03-7
	BH18-05-55	BH18-05-5
	BH18 08 100	BH18-08-10
	BH18-17-111	BH18-17-11
	BH18-18-122A	BH18-18-12A
	BH18 30 55	BH18-30-5
PAHs	BH18-03-211	BH18-03-21
	BH18-05-55	BH18-05-5
	BH18-08-100	BH18-08-10
	BH18 14 77	BH18 14-7
	BH18-17-111	BH18-17-11
	BH18-18-122A	BH18-18-12A
	BH18 27 66	BH18-27-6
	BH18-29-44	BH18-29-4
	BH18-30-66	BH18-30-6
VOCs naphthalene	SVP18-03	SVP18-DUP

Both ALS and Maxxam implement internal QA/QC programs that include preparation and analysis of appropriate control samples, including laboratory blank, spiked blank, laboratory duplicate and matrix spike samples. Results of laboratory QA/QC samples are reviewed and compared to accepted limits for precision, accuracy and completeness. No issues with QA/QC violations were reported by the analytical laboratory.

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4.8.4 Data Review and Validation

Sampling data generated for this project was reviewed and verified by SNC-Lavalin personnel to ensure that data conforms to and satisfies project objectives. Data verification includes ensuring that calibration of field instruments was satisfactory and field blank and field duplicates meet acceptable criteria. The data validation and reporting process for the laboratory data involves ensuring that the holding times, precision, accuracy, laboratory blanks, and detection limits are within acceptance criteria. Where significant variances are identified, the final report is reviewed to determine if the overall project objectives are met and/or if additional investigations are required and corrective actions are initiated as required.

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5 Review and Evaluation

5.1 Geology

Borehole logs are provided in Appendix C. The regional overburden geology, as interpreted by Map 2556 (Barnett et. al, 1991) and Map 2544 (OGS, 1991), comprises predominantly sand, gravelly sand and gravel, underlain by shale, limestone, dolostone or siltstone bedrock. Bedrock was not encountered during this investigation.

Based on observations during the drilling program, the overburden material investigated at the site is comprised predominantly of fill, consisting of silty sand interspersed with waste materials and debris including brick debris, asphalt fragments, glass, wood, black aggregate, ash and tar like residue. The fill was typically underlain by a native silty sand which is subsequently underlain by silty clay. These observations were consistent with previous investigations at the site. The thickness of individual stratigraphic units varied significantly across the site, as shown in borehole logs. In general, mixed fill (typically gravelly, sand or silty sand mixed with various types of debris as described above) was encountered to depths ranging from near surface to 11.4 m bgs (BH18-20 and BH18-01, respectively). The maximum depth of investigations (17.4 m bgs) did not fully penetrate the silty clay unit.

5.2 Groundwater Elevations, Hydraulic Gradient and Flow Directions

The depth to groundwater measurements were used to develop groundwater elevation contours for the site, which are presented on Figures 6 and 7. Although no apparent confining stratigraphic layers are present, the difference in hydraulic conductivities between in the predominantly coarse textured fill material and the underlying finer textured native soil results in some variation in the groundwater elevations and flow paths.

The monitoring wells screened between 79.14 m and 71.21 m asl (deep monitoring wells) had an average hydraulic gradient of 0.014 m/m, with an inferred groundwater flow direction towards the north. The monitoring wells with screened intervals between 91.65 m to 79.33 m asl (shallow monitoring wells) had an average hydraulic gradient of 0.03 m/m with an inferred groundwater flow direction towards the northwest and north.

The hydraulic gradients and groundwater flow directions reported here are generally consistent with the results from previous investigations.

Vertical hydraulic gradients cannot be calculated, as nested wells were not installed as part of the Phase II investigation, however a general review of the water level contour maps indicates that in the southern portion of the site, there may be some component of downward flow into the native soils, while at the northern limit of the site, there is no pronounced vertical gradient present.

5.3 Hydraulic Conductivity Testing

Hydraulic conductivity testing was carried out at four of the newly installed monitoring wells (MW18-02, MW18-04, MW18-14 and MW18-16) following monitoring well development on September 12 and 13, 2018. The hydraulic conductivity test analysis reports are included in Appendix D.

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The results of the hydraulic conductivity analysis is summarized in the following table:

Monitoring well ID	Depth to bottom of well (m bgs)	Screen Top Elev (m asl)	Bottom of Well Elev(m asl)	Hydraulic Conductivity - K (m/s)	Stratigraphy in Screened Interval
MW18-02	8.95	84.20	81.15	6.50×10^{-07}	Clay and silt
MW18-04	5.45	90.70	87.65	3.55×10^{-07}	Sandy silt fill
MW18-14	5.15	91.65	88.60	1.07×10^{-06}	Sand and sandy silt fill
MW18-16	7.05	90.31	87.26	6.47×10^{-07}	Sand and silt fill

Three of the wells (MW18-04, MW18-14 and MW18-16) were screened in the upper fill layer, with MW18-02 screened in the underlying sandy silt and clay. Based on the hydraulic conductivity estimates obtained, the geometric mean of the hydraulic conductivity in the upper fill layer is estimated to be 6.9×10^{-7}. However, the four monitoring wells have generally similar results, and are consistent with reference values for the stratigraphy present in the tested screen intervals.

5.4 Soil Texture

Overburden material present at the site comprised mainly gravelly sand or silty sand, underlain by clay or silty clay to a maximum depth of 17.4 m bgs. Four soil samples (BH18-03-06, BH18-03-15, BH18-10-8 and, BH18-14-6) were collected for analysis of grain size distribution. The corresponding percentage of the sample determined to be greater than 75 µm is summarized as follows:

Sample ID	% >75µm
BH18-03-06	82.1
BH18-03-15	55.3
BH18-10-8	90.9
BH18-14-6	81.9

These results (Appendix A) confirmed that all four samples are predominantly composed of material that is greater than 75 µm in diameter. Accordingly the soil texture at the site is classified as coarse textured, as it is inferred that at least 1/3 of the soil at the site, measured by volume, consists of soil that is considered coarse.

5.5 Soil: Field Screening and Field Observations

Field observations and results of field screening for soil samples are summarized in the borehole logs in Appendix C. The maximum volatile organic vapour reading of 225 ppmv and combustible organic vapour reading of 110 ppmv were measured from soil sample BH18-27-5. OVM and PID readings measured for soil samples collected during drilling ranged from < 5 ppmv to 225 ppmv and <5 ppmv to 110 ppmv, respectively.

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Field observations during drilling and soil sampling identified the presence of dark brown to black staining in soil at most boreholes with the exceptions of BH18-01, BH18-05 and BH18-11 to BH18-15. Black staining was typically accompanied by a tar-like odour and in several locations the presence of black sheen was noted on soil samples. Debris was observed to be widespread in the fill material present at the site.

5.6 Soil Quality

Analytical results for borehole soil samples are summarized in Tables 2 to 11, with the selected MECP Table 5 standards for surface and subsurface soil provided in the corresponding tables for comparison. Soil analytical results are also presented in Figures 8 to 13. Laboratory Certificates of Analysis for soil samples are provided in Appendix E.

5.6.1 BTEX, F1 to F4 PHC, VOCs

5.6.1.1 Surface Soil

Concentrations of one or more of PHC F2, and/or F3 exceeded the selected MECP Table 5 standards in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-11 and BH18-5. Locations, depths and analytical results are provided in Figure 8, and Tables 2 and 4.

5.6.1.2 Sub-Surface Soil

Concentrations of one or more of benzene, toluene, ethylbenzene, xylenes, PHC F2, and/or F3 exceeded the selected MECP Table 5 standards in soil samples collected from boreholes BH18-06, BH18-07, BH18-15, BH18-25, BH18-26, BH18-27, BH18-28 and BH18-29. Locations, depths and analytical results are shown in Figure 9, and Tables 3 and 5.

5.6.2 Metals and Inorganics

5.6.2.1 Surface Soil

Concentrations exceeding the selected MECP Table 5 standards for one or more metals and inorganics parameters including electrical conductivity, cyanide, sodium adsorption ratio, antimony, arsenic cadmium, copper, lead, mercury and zinc, were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10, BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18. Locations, depths and analytical results are shown in Figure 10, and Table 10.

5.6.2.2 Sub-Surface Soil

Concentrations exceeding the selected MECP Table 5 standards for mercury were identified in soil samples collected from boreholes BH18-06, BH18-08, BH18-16, BH18-18, BH18-23, BH18-25, BH18-28 and BH18-29. Locations, depths and analytical results are shown in Figure11 and Table 11.

5.6.3 PAHs

5.6.3.1 Surface Soil

Concentrations exceeding the selected MECP Table 5 standards for one or more PAH parameters including acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10,

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BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18. Locations, depths and analytical results are shown in Figure 12 and Table 12.

5.6.3.2 Sub-Surface Soil

Concentrations of one or more PAH parameters including acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, 1-&2-methylnaphthalene, naphthalene, phenanthrene and pyrene exceeded the selected MECP Table 5 standards in soil samples collected from boreholes BH18-04, BH18-06, BH18-07, BH18-10, BH18-14, BH18-17, BH18-18 and BH18-25 to BH18-29. Locations, depths and analytical results are shown in Figure 13 and Table 7.

5.6.4 Polychlorinated Biphenyls (PCBs)

5.6.4.1 Surface Soil

Concentrations exceeding the selected MECP Table 5 standards for total PCBs were identified in soil samples collected from boreholes BH18-08 and BH18-09. Locations, depths and analytical results are shown in Figure 12 and Table 8.

5.6.4.2 Sub-Surface Soil

No sub-surface soil samples had concentrations of PCB parameters that exceeded the selected MECP Table 5. Analytical results are shown in Table 9.

5.6.5 Waste Classification

Analytical results for the composite soil sample submitted for O. Reg. 347 waste classification are provided in Table 12. Results indicate that soil cuttings produced during investigation activities may be classified as non-hazardous waste for the purpose of off-site disposal in the Province of Ontario. Laboratory Certificates of Analysis for the waste classification sample are provided in Appendix F.

5.6.6 Evaluation of Light or Dense Non-Aqueous Liquids (Soil)

The MECP generic standards, including the Table 5 standards selected for use at this site, were established considering the potential presence of free phase (non-aqueous) product and as such concentrations of contaminants less than the MECP Table 5 standards are unlikely to predict the presence of free phase product. Consequently, only contaminants indicative of the presence of NAPL exceeding the MECP Table 5 standards (benzene, ethylbenzene, xylenes, PHC F1 to F3 and PAHs) were considered in the evaluation of the potential presence of non-aqueous liquids.

The document, *"Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario"* (MOE, 2011c) provides the free phase thresholds in coarse textured soil for contaminants for which generic standards were developed. The free-phase threshold for the contaminants exceeding the MECP Table 5 standards are summarized below with maximum measured on-site concentrations and locations from the current investigation:

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Parameter	Free Phase Threshold (µg/g)	Max. Concentration(s)Phase II ESA (mg/g)	Sampling Location
PHC F2	2,700	**7,690, 13,800, 4,330**	**BH18-06-6, BH18-27-5 and BH18-28-9**
PHC F3	5,800	**8,620**	**BH18-27-5**
Naphthalene	2,800	**2,530**	**BH18-27-6**

The maximum on-site concentrations of PHC F2 and F3 exceed the free phase threshold, predicting the potential presence of free phase liquid in boreholes BH18-06, BH18-27 and BH18-28 as well as potential naphthalene at BH18-27. However, the free-phase threshold is a conservative approximation based on chemical and physical properties; therefore an exceedance of the threshold does not necessarily confirm the presence of free-phase liquid. Field observation of soil conditions in boreholes BH18-06, BH18-27 and BH18-28 did identify staining or sheen that is suggestive of the presence of free phase product in the soil.

5.7 Groundwater Quality

Analytical results for groundwater samples are summarized in Tables 11 to 17, with the selected MECP Table 5 Site Condition Standards (SCS) provided in the tables for comparison. Concentrations of contaminants that exceeded an SCS, are summarized on Figures 14 to 17. Monitoring well screen intervals and corresponding elevations are included in these figures. Laboratory Certificates of Analysis for groundwater samples are provided in Appendix G.

5.7.1 BTEX, F1 to F4 PHC

Concentrations of one or more of benzene and PHCs F2 and F3 exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-101, MW-104, MW-115, MW-17-17 and MW18-25 to MW18-30 during September 2018. Refer to Figure 14 and Table 13 for locations and analytical results for samples. A number of the reported concentrations exceed the theoretical solubility limit for the relevant parameters.

5.7.2 VOCs (not including BTEX)

Concentrations of VOC parameter, trichloroethylene, exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-103, MW18-04 and MW18-24 during September 2018. Refer to Figure 16 and Table 14 for locations and analytical results for samples.

5.7.3 PAHs

Concentrations of one or more PAH parameters including acenaphthene, acenaphthylene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and naphthalene exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-104, MW-115, MW-202, MW-17-17 and MW18-25 to MW18-29 during September 2018. Refer to Figure 15 and Table 16 for locations and analytical results for samples.

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5.7.4 Metals and Inorganics

Concentrations of zinc exceeded the selected MECP Table 5 standards in the groundwater sample collected from monitoring well MW-203, during September 2018. Refer to Figure 17 and Table 15 for locations and analytical results for samples.

5.7.5 PCBs

All samples submitted for analysis for PCBs, satisfied the selected MECP Table 5 standards in groundwater samples. Refer to Table 17 for analytical results for samples.

5.7.6 Evaluation of Light or Dense Non-Aqueous Liquids (Groundwater)

NAPL was not detected in the on-site monitoring wells during monitoring well development, monitoring or sampling although sheen was observed on water purged from monitoring wells MW18-25, MW18-26 and MW18-27. The water level was above the screened interval of monitoring well MW18-25, during the sampling event which could prevent the capture and identification of LNAPL, if present.

While no measurable NAPL was observed during monitoring and sampling, concentrations of some parameters of were above the corresponding theoretical ½ solubility limit indicating the potential for free-phase product to be present in groundwater. As such, the potential for NAPL to be present in groundwater cannot be discounted.

5.8 Soil Vapour

Generic Site Condition Standards for evaluation of soil vapour have not been developed by the MECP; however, soil vapour screening levels, considered to be protective of potential risks via the vapour intrusion pathway can be derived using the MOE (2011a) Modified Generic Risk Assessment (MGRA) Model by dividing the health based indoor air criteria by a default attenuation factor of 0.02. The subsequent Risk Assessment to be completed at the site will detail the approach to developing site specific soil vapour screening levels. In the interim, the MGRA model provides parameter criteria for Tier 2 soil vapour and health based indoor air for residential settings. Laboratory Certificates of Analysis for soil vapour samples are provided in Appendix H. The soil vapour results are presented in Table 18 and Figure18 and are compared against the un-attenuated health-based indoor air criteria for residential settings.

Soil vapour concentrations of one or both of benzene and naphthalene exceed the health based indoor air criteria for residential settings, not corrected for potential attenuation. Based on the observed concentration of benzene at SVP18-04 it is expected that even with a conservative attenuation factor of 0.02, there is a potential for impacts to indoor air at the Site. It is understood that no buildings and/or enclosed structures are proposed as part of the current park redevelopment plans.

5.9 Quality Assurance and Quality Control Results

A QA/QC program was implemented to minimize and quantify impacts introduced during sample collection, handling, shipping and analysis. As part of the QA/QC program, sampling protocols included minimizing sample handling, submitting field QA/QC samples, using dedicated non-contaminating sampling equipment and/or implementing decontamination procedures between uses of re-usable sampling equipment, using sample specific identification and labelling procedures, and using chain of

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custody records. Field duplicate soil and groundwater samples, as well as field and trip blank samples were prepared and analysed as noted previously to assess reproducibility of results.

Laboratory analysis was completed in accordance with Standard Methods (e.g., MOE, 2011a) and generally accepted industry practices. Laboratory QA/QC measures included analysis of laboratory blank, spiked blank, duplicate and matrix spike samples. A certificate of analysis has been received for each sample submitted for analysis and all certificates of analysis have been included in full in Appendices E to H. All certificates of analysis received from the contract analytical laboratory comply with sub-section 47(3) of the regulation. A review of the certificates of analysis identified several instances where the analytical laboratory noted that RDLs for some parameters were adjusted as a result of the need to dilute the sample prior to analysis. With the exception of the PHC RDLs discussed, adjusted RDLs were less than the selected MECP site condition standard for that parameter.

For blind field duplicate samples, the relative percent difference (RPD) was calculated to assess correlation between duplicate samples and their analytical pairs. The RPD is calculated by the following formula:

$$RPD = \frac{|X_1 - X_2|}{X_{avg}} \times 100$$

where X_1 and X_2 are the duplicate sample concentrations and X_{avg} is the mean of X_1 and X_2. Analytical error increases near the RDL; therefore the RPD is not typically calculated unless the concentrations of the duplicate samples are greater than five (5) times the RDL. Generally accepted RPDs for laboratory duplicates are approximately 40 to 50% for soil and 20 to 40% for groundwater. For field duplicates, acceptable limits for RPDs are 70% for soil inorganic parameters, 100% for soil organic parameters, 50% for groundwater inorganic parameters and 80% for groundwater organic parameters. If the RPD for a field duplicate sample and its analytical pair did not meet acceptable RPD limits, an explanation is provided below. RPD calculations for field duplicate soil sample pairs are provided in Tables E.1 to E.4 with the laboratory certificates of analysis for soil samples (Appendix E).

Soil

RPDs elevated above alert limits for several metals and general inorganic parameters were identified for soil sample pairs BH18-03-3/BH18-03-33, BH18-06-5/BH18-06-55, BH18-08-11/BH18-08-111, BH18-10-1/2/BH18-100-1/2 and BH18-29-2/BH18-29-22. These differences are attributed to sample heterogeneity in the soil due to the highly variable nature of the fill observed. These results are not expected to affect the outcome of the investigation as parameters in both the original and duplicate samples generally exceeded the selected MECP Table 5 standards.

RPDs elevated above alert limits for several PAH parameters were identified for soil sample pairs BH18-27-6/BH18-27-66 and BH18-30-6/BH18-30-66. The RPD failures are attributed to the high degree of impact observed in the sample pair at BH18-27, with concentrations of several parameters at or above the free phase threshold, in addition to the presence of observed sheen in soil samples as well as expected sample heterogeneity in the soil at due to the highly variable nature of the fill observed. The RPD failure observed from the sample pair at BH18-30 is attributed to expected sample heterogeneity in the soil due to the highly variable nature of the fill observed. These results are not expected to affect the outcome of the investigation as parameters in both the original and duplicate samples generally exceeded the selected MECP Table 5 standards.

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All calculated RPDs for remaining samples for PHCs, VOCs and PCBs were within generally accepted industry standards.

Groundwater

Groundwater QA/QC was assessed using laboratory control and verification methods. The laboratory certificates of analysis for groundwater samples (Appendix F). All laboratory calculated RPDs were within laboratory accepted standards.

Soil Vapour

For QA/QC measures, one (1) field duplicate sample collected from SVP18-03 was submitted to Maxxam for Method TO-15 analysis. Soil Vapour QA/QC was assessed using laboratory control and verification methods. The laboratory certificates of analysis for groundwater samples (Appendix H). All laboratory calculated RPDs were within laboratory accepted standards.

As described above, SVP development and leak testing at soil vapour probes SVP18-01 to SVP18-04 helium concentrations (ranging from 0.01% to 0.05% v/v) were detected in vapours prior to collection of samples.

For the field duplicate samples, evaluations of the QA/QC results were determined by calculating the relative percent difference (RPD) between the field duplicate and original sample results, and comparison of the RPD to designated alert limits as above.

Analytical results for the field duplicate soil vapour samples (SVP18-03 and SVP18-DUP) generally showed good correlation with their corresponding analytical pairs. As shown in Table H.1, field duplicate RPDs were within the alert limits.

A certificate of analysis has been received for each sample submitted for analysis and all certificates of analysis have been included in full in Appendix H. The results of laboratory QA/QC analyses are presented in the Laboratory Certificates of Analysis. The analyses included laboratory duplicates (to evaluate variance in the measurement), spiked blanks (to evaluate method accuracy), method blanks (to identify laboratory contamination) and surrogates (to evaluate extraction efficiency).

Summary

The results from the field QA/QC program suggest that soil, groundwater and soil vapour sample handling and analytical protocols were generally acceptable and that analytical results are reproducible within acceptable tolerances.

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6 Phase II ESA Conceptual Site Model

The Phase II ESA CSM will be updated for inclusion in the subsequent Risk Assessment to be completed for the site and will include a description of the physical setting, areas of known or confirmed impact, contaminants present at the site and diagrams including cross sections indicating subsurface geological, hydrogeological and contaminant distribution conditions.

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7 Conclusions

SNC-Lavalin was retained by the City of Hamilton to conduct a Supplementary Phase II ESA at 171 Bay Street North, Central Park in Hamilton, Ontario.

Thirty boreholes (BH 18-01 to BH 18-30) were advanced at the site between August 28, 2018 and September 17, 2018. Depth of boreholes ranged between 1.5 m bgs to 17.4 m bgs. Nineteen boreholes were completed with monitoring wells and four boreholes with soil vapour probes.

The overburden material investigated at the site is comprised predominantly of fill, consisting of silty sand interspersed with waste materials and debris including brick debris, asphalt fragments, glass, wood, black aggregate, ash and tar like residue. The fill was generally underlain by a native silty sand which is subsequently underlain by silty clay. The silty clay unit was not fully penetrated as part of this investigation.

Deeper monitoring wells screened between 79.14 m and 71.21 m asl had an average hydraulic gradient of 0.014 m/m, with an inferred groundwater flow direction towards the north. Shallow monitoring wells with screened intervals between 91.65 m to 79.33 m asl had an average hydraulic gradient of 0.03 m/m with an inferred groundwater flow direction towards the northwest and north.

The hydraulic gradients and groundwater flow directions are generally consistent with the results from previous investigations. Hydraulic conductivity of upper fill layer is estimated to be 6.9×10^{-7}.

Soil grain size analysis confirmed that soil present at the site is predominantly composed of material that is greater than 75 µm in diameter. Accordingly the soil texture at the site is classified as coarse textured.

Based on the field screening the maximum volatile organic vapour reading of 225 ppmv and combustible organic vapour reading of 110 ppmv were measured from soil sample BH18-27-5. OVM and PID readings measured for soil samples collected during drilling ranged from < 5 ppmv to 225 ppmv and <5 ppmv to 110 ppmv, respectively.

Field observations during drilling and soil sampling identified the presence of dark brown to black staining in soil at most boreholes with the exceptions of BH18-01, BH18-05 and BH18-11 to BH18-15. Black staining was typically accompanied by a tar-like odour and in several locations the presence of black sheen was noted on soil samples. Debris was observed to be widespread in the fill material present at the site.

Concentrations of one or more of PHC F2, and/or F3 exceeded the selected MECP Table 5 standards in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-11 and BH18-5.

Concentrations of one or more of benzene, toluene, ethylbenzene, xylenes, PHC F2, and/or F3 exceeded the selected MECP Table 5 standards in subsurface soil samples collected from boreholes BH18-06, BH18-07, BH18-15, BH18-25, BH18-26, BH18-27, BH18-28 and BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for one or more metals and inorganics parameters including electrical conductivity, cyanide, sodium adsorption ratio, antimony, arsenic cadmium, copper, lead, mercury and zinc, were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10, BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18.

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Concentrations exceeding the selected MECP Table 5 standards for mercury were identified in subsurface soil samples collected from boreholes BH18-06, BH18-08, BH18-16, BH18-18, BH18-23, BH18-25, BH18-28 and BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for one or more PAH parameters including acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, were identified in shallow soil samples (<1.5 m bgs) collected from boreholes BH18-01, BH18-02, BH18-04, BH18-06 to BH18-08, BH18-10, BH18-11, BH18-17, BH18-18, BH18-23, BH18-27, BH18-29, SS18-7, SS18-9, SS18-11, SS18-15 and SS18-18.

Concentrations of one or more PAH parameters including acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, 1-&2-methylnaphthalene, naphthalene, phenanthrene and pyrene exceeded the selected MECP Table 5 standards in subsurface soil samples collected from boreholes BH18-04, BH18-06, BH18-07, BH18-10, BH18-14, BH18-17, BH18-18 and BH18-25 to BH18-29.

Concentrations exceeding the selected MECP Table 5 standards for total PCBs were identified in shallow soil samples collected from boreholes BH18-08 and BH18-09.

No sub-surface soil samples had concentrations of PCB parameters that exceeded the selected MECP Table 5.

Analytical results for the composite soil sample submitted for O. Reg. 347 waste classification indicate that soil cuttings produced during investigation activities may be classified as non-hazardous waste for the purpose of off-site disposal in the Province of Ontario.

The maximum on-site concentrations of PHC F2 and F3 in soil exceed the free phase threshold, predicting the potential presence of free phase liquid in boreholes BH18-06, BH18-27 and BH18-28 as well as potential naphthalene at BH18-27.

Concentrations of one or more of benzene and PHCs F2 and F3 exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-101, MW-104, MW-115, MW-17-17 and MW18-25 to MW18-30 during September 2018. A number of the reported concentrations exceed the theoretical solubility limit for the parameter.

Concentrations of VOC parameter, trichloroethylene, exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-103, MW18-04 and MW18-24 during September 2018.

Concentrations of one or more PAH parameters including acenaphthene, acenaphthylene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and naphthalene exceeded the selected MECP Table 5 standards in groundwater samples collected from monitoring wells MW-104, MW-115, MW-202, MW-17-17 and MW18-25 to MW18-29 during September 2018.

Concentrations of zinc exceeded the selected MECP Table 5 standards in the groundwater sample collected from monitoring well MW-203, during September 2018.

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All samples submitted for analysis for PCBs, satisfied the selected MECP Table 5 standards in groundwater samples.

While no measurable NAPL was observed during monitoring and sampling, concentrations of some parameters of were above the corresponding theoretical ½ solubility limit indicating the potential for free-phase product to be present in groundwater.

Soil vapour concentrations of one or both of benzene and naphthalene exceed the health based indoor air criteria for residential settings, not corrected for attenuation. Based on the observed concentration of benzene at SVP18-04 it is expected that even with a conservative attenuation factor of 0.02, the potential for impact to indoor air at this location may be present. It is understood that no buildings and enclosed structures are proposed for park redevelopment.

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8 Closure

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Environment & Geoscience
Infrastructure

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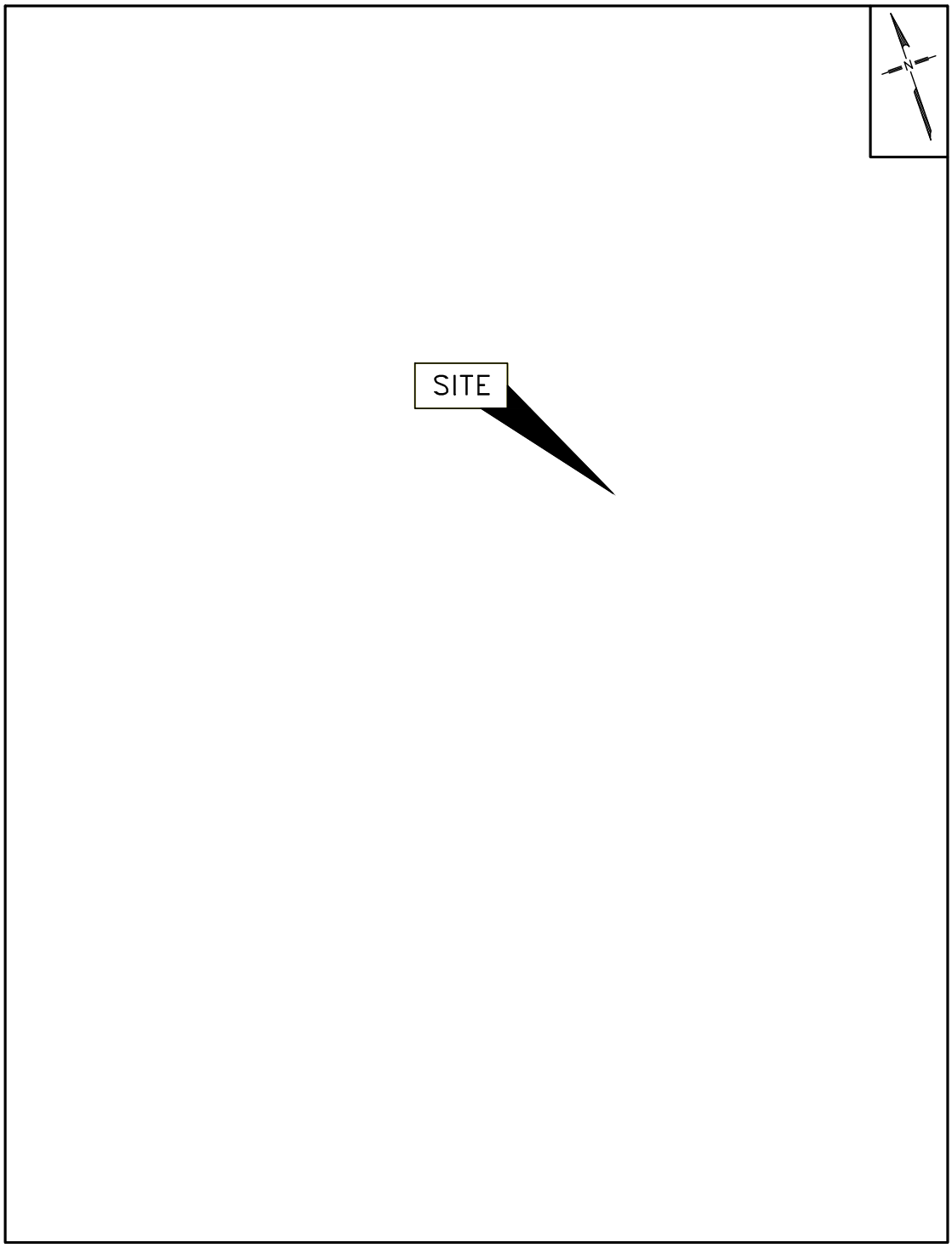
Figures



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Client/Location: CITY OF HAMILTON CENTRAL PARK, HAMILTON, ON		Title: SITE LOCATION PLAN	
Project No: 648696	Filename: 005F01_655184	Date: OCTOBER 2018	Dwg No: FIGURE 1
Drawn: AG	Verified: LB	Project Manager: LB	

FILENAME: P:\HAM\Central Park\655184\40_Execution\47_Wrkg_Vers\CAD_GIS\005 (RA)\005F01_655184.dwg

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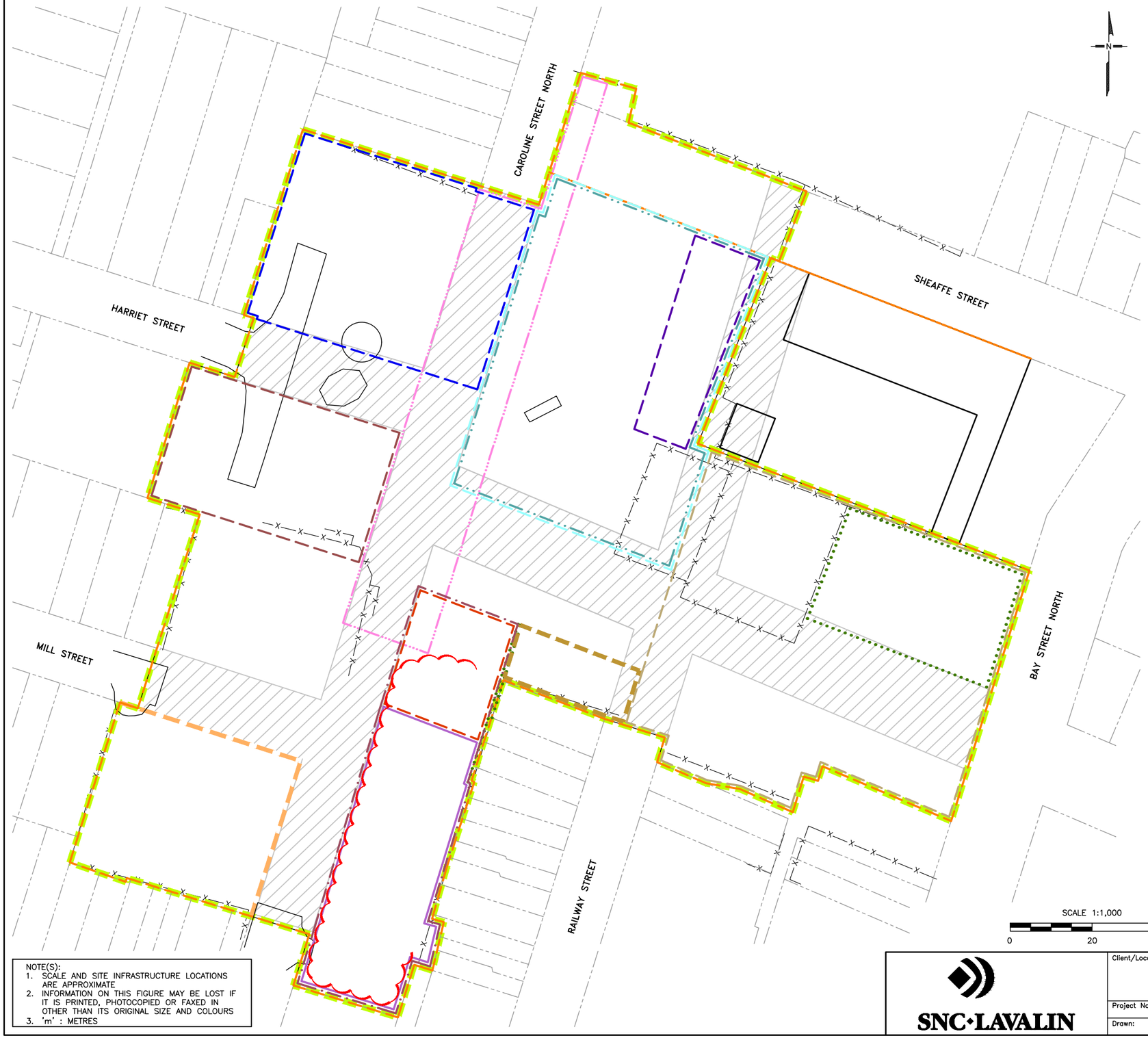

APEC No.	ON-SITE/OFF-SITE ACTIVITIES	PCA No.	POTENTIAL CONTAMINANTS OF CONCERN
APEC #1	ENTIRE SITE	30	METALS, VOCs, PAHs, AND PHCs
APEC #2	NORTHERN PORTION OF SITE (IN VICINITY OF FORMER CAROLINE STREET)	46	METALS, VOCs, PAHs, AND PHCs
APEC #3	NORTHERN PORTION OF THE SITE (CURRIE PRODUCTS, HISTORICALLY LOCATED TO THE EAST OF FORMER CAROLINE STREET AND SOUTH OF FORMER SHEAFE STREET)	9	METALS, VOCs, PAHs, AND PHCs
APEC #4	NORTHERN PORTION OF THE SITE (CURRIE PRODUCTS, HISTORICALLY LOCATED AT THE SOUTHEAST CORNER OF CAROLINE AND SHEAFE)	5	METALS, VOCs, PAHs, AND PHCs
APEC #5	CENTRAL PORTION OF THE SITE (UNITED GAS AND FUEL COMPANY, HISTORICALLY LOCATED AT THE SOUTHEAST CORNER OF CAROLINE AND MULBERRY)	9	METALS, VOCs, PAHs, AND PHCs
APEC #6	WESTERN PORTION OF THE SITE (METAL PLATING FACILITY, HISTORICALLY LOCATED AT THE SOUTHWEST CORNER OF CAROLINE AND HARRIET)	34	METALS, VOCs, PAHs AND PHCs
APEC #7	NORTHWESTERN PORTION OF THE SITE (HISTORICAL JUNK YARD IDENTIFIED NEAR THE NORTHWEST CORNER OF CAROLINE AND HARRIET)	49	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #8	SOUTHWESTERN PORTION OF THE SITE (HISTORICAL JUNK YARD IDENTIFIED NEAR THE SOUTHWEST CORNER OF CAROLINE AND MILL)	49	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #9	SOUTHERN PORTION OF THE SITE (HISTORICAL JUNK YARDS IDENTIFIED AT THE NORTHEAST CORNER OF CAROLINE AND CANNON)	49	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #10	CENTRAL PORTION OF THE SITE (HISTORICAL JUNK YARD IDENTIFIED AT THE SOUTHWEST CORNER OF RAILWAY AND MULBERRY)	49	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #11	EASTERN PORTION OF THE SITE (HISTORICAL GARAGE/TRUCK MAINTENANCE FACILITY LOCATED IN THE VICINITY OF EXISTING TENNIS COURTS)	27	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #12	EASTERN PORTION OF THE SITE (LANDFILL REPORTEDLY PRESENT TO THE SOUTH OF THE EXISTING EMS BUILDING)	58	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #13	SOUTHERN PORTION OF THE SITE (CRESCENT OIL, HISTORICALLY LOCATED AT THE SOUTHEAST CORNER OF MULBERRY AND CAROLINE)	28	METALS, VOCs, PAHs, PHCs, AND PCBs
APEC #14	NORTHERN PORTION OF THE SITE (POTENTIAL PRESENCE OF A BURIED RAIL CAR)	NA	METALS, VOCs, PAHs, AND PHCs
APEC #15	SOUTHERN PORTION OF THE SITE (CRESCENT OIL CURRENTLY LOCATED AT 136 CANNON STREET WEST AND SUSPECTED UST AT RESIDENCE LOCATED AT 31 RAILWAY)	28 AND 34	METALS, VOCs, PAHs, AND PHCs
APEC #16	EASTERN PORTION OF THE SITE (COAL GASIFICATION HISTORICALLY LOCATED AT 160 BAY STREET N AND 100 MULBERRY, AND 25,000 L UST AT 160 BAY STREET N	9	METALS, VOCs, PAHs, AND PHCs
APEC #17	NORTHERN PORTION OF THE SITE (125 BARTON HISTORICALLY OCCUPIED BY HAMILTON BRIDGE AND TANK CO LTD, MATERIALS AND TRANSFORMERS, AND SUBSEQUENT PCB STORAGE SITE)	9	METALS, VOCs, PAHs, AND PHCs

LEGEND

- PHASE ONE STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE
- FORMER RAILWAY
- APEC #6
- APEC #7
- APEC #8
- APEC #9
- APEC #10
- APEC #11
- APEC #12
- APEC #13
- APEC #14
- APEC #15
- APEC #16
- APEC #17

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

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Client/Location: CITY OF HAMILTON CENTRAL PARK, HAMILTON, ON

Title: PHASE ONE CONCEPTUAL SITE MODEL AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

Project No:	Filename:	Date:	Dwg No:
655184	005F04_655184	OCTOBER 2018	FIGURE 4
Drawn: AG	Verified: LB	Project Manager: LB	

PAGE FORMAT: 11x17

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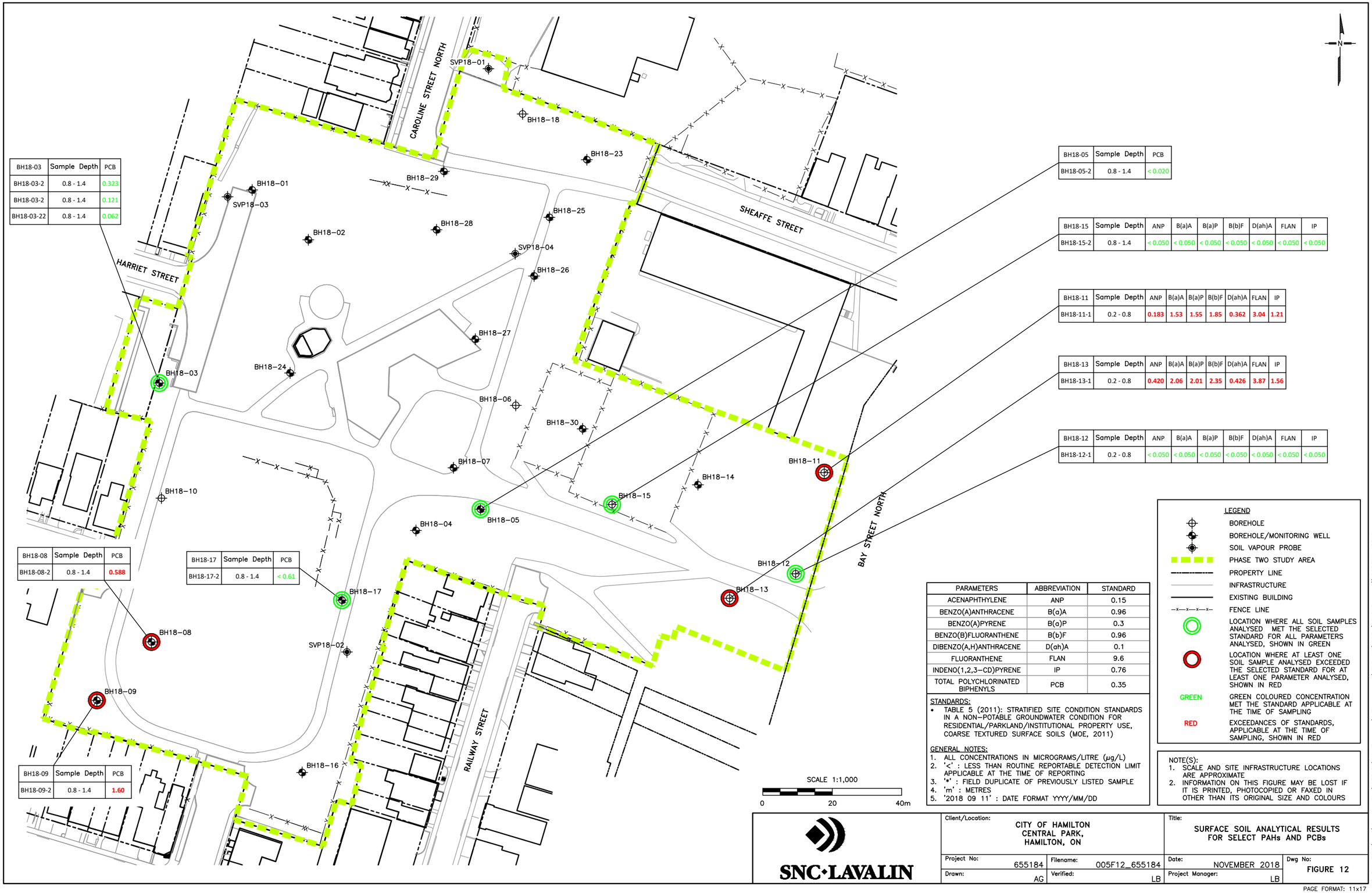

BH18-03	Sample Depth	PCB
BH18-03-2	0.8 - 1.4	0.323
BH18-03-2	0.8 - 1.4	0.121
BH18-03-22	0.8 - 1.4	0.062

BH18-05	Sample Depth	PCB
BH18-05-2	0.8 - 1.4	< 0.020

BH18-15	Sample Depth	ANP	B(a)A	B(a)P	B(b)F	D(ah)A	FLAN	IP
BH18-15-2	0.8 - 1.4	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

BH18-11	Sample Depth	ANP	B(a)A	B(a)P	B(b)F	D(ah)A	FLAN	IP
BH18-11-1	0.2 - 0.8	**0.183**	**1.53**	**1.55**	**1.85**	**0.362**	**3.04**	**1.21**

BH18-13	Sample Depth	ANP	B(a)A	B(a)P	B(b)F	D(ah)A	FLAN	IP
BH18-13-1	0.2 - 0.8	**0.420**	**2.06**	**2.01**	**2.35**	**0.426**	**3.87**	**1.56**

BH18-12	Sample Depth	ANP	B(a)A	B(a)P	B(b)F	D(ah)A	FLAN	IP
BH18-12-1	0.2 - 0.8	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

BH18-08	Sample Depth	PCB
BH18-08-2	0.8 - 1.4	**0.588**

BH18-17	Sample Depth	PCB
BH18-17-2	0.8 - 1.4	< 0.61

BH18-09	Sample Depth	PCB
BH18-09-2	0.8 - 1.4	**1.60**

PARAMETERS	ABBREVIATION	STANDARD
ACENAPHTHYLENE	ANP	0.15
BENZO(A)ANTHRACENE	B(a)A	0.96
BENZO(A)PYRENE	B(a)P	0.3
BENZO(B)FLUORANTHENE	B(b)F	0.96
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.1
FLUORANTHENE	FLAN	9.6
INDENO(1,2,3–CD)PYRENE	IP	0.76
TOTAL POLYCHLORINATED BIPHENYLS	PCB	0.35

STANDARDS:
- TABLE 5 (2011): STRATIFIED SITE CONDITION STANDARDS IN A NON–POTABLE GROUNDWATER CONDITION FOR RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE, COARSE TEXTURED SURFACE SOILS (MOE, 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/LITRE (µg/L)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'm' : METRES
5. '2018 09 11' : DATE FORMAT YYYY/MM/DD

LEGEND
- BOREHOLE
- BOREHOLE/MONITORING WELL
- SOIL VAPOUR PROBE
- PHASE TWO STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE
- LOCATION WHERE ALL SOIL SAMPLES ANALYSED MET THE SELECTED STANDARD FOR ALL PARAMETERS ANALYSED, SHOWN IN GREEN
- LOCATION WHERE AT LEAST ONE SOIL SAMPLE ANALYSED EXCEEDED THE SELECTED STANDARD FOR AT LEAST ONE PARAMETER ANALYSED, SHOWN IN RED
- GREEN — GREEN COLOURED CONCENTRATION MET THE STANDARD APPLICABLE AT THE TIME OF SAMPLING
- RED — EXCEEDANCES OF STANDARDS, APPLICABLE AT THE TIME OF SAMPLING, SHOWN IN RED

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

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Client/Location: CITY OF HAMILTON, CENTRAL PARK, HAMILTON, ON

Title: SURFACE SOIL ANALYTICAL RESULTS FOR SELECT PAHs AND PCBs

Project No:	Filename:	Date:	Dwg No:
655184	005F12_655184	NOVEMBER 2018	FIGURE 12
Drawn: AG	Verified: LB	Project Manager: LB	

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FILENAME: P:\HAM\Central Park\655184\40_Execution\47_Wrkg_Vers\CAD_GIS\005 (2018 Phase 2)\005F12_655184.dwg

BH18-25	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-29-4	2.3 - 2.9	6.75	**0.33**	**2.16**	**1.92**	**1.75**	**2.50**	1.33	0.91	1.86	**0.28**	5.70	4.54	**1.17**	9.59	12.8	22.3	**233**	11.9	4.08
BH18-29-44	2.3 - 2.9	**8.5**	< 1.3	**2.2**	**3.4**	**2.9**	**3.9**	1.8	**1.5**	3.2	< 1.3	9.3	4.2	**1.8**	9.97	13.0	23.0	**209**	12.9	6.7
BH18-29-7	4.6 - 5.2	**31.2**	< 1.3	**7.6**	**4.9**	**3.5**	**4.9**	2.1	**1.7**	4.6	< 1.3	**22.9**	23.3	**2.1**	20.4	33.6	**54.0**	**286**	56.7	14.5

BH18-28	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-28-5	2.3 - 2.9	**127**	< 1.3	**48.0**	**10.2**	**4.0**	**6.1**	1.8	**2.0**	8.5	< 1.3	**67.2**	**100**	**1.9**	**52.5**	**102**	**154**	**785**	192	40.8
BH18-28-9	6.1 - 6.7	**65.8**	**5.0**	**23.5**	**26.7**	**21.5**	**26.4**	**10.0**	**9.8**	**21.9**	**2.7**	**57.7**	48.7	**11.1**	**125**	**251**	**375**	**1,170**	128	42.1

BH18-01	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-01-8	5.3 - 5.9	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-01-16	11.4 - 12.0	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-02	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-02-5	3.0 - 3.7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-02-12	8.4 - 9.0	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-24	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-24-6	3.8 - 4.4	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-24-12	8.4 - 9.0	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-03	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-03-6	3.8 - 4.4	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-03-21	15.2 - 15.8	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-03-211	15.2 - 15.8	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-07	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-07-9	6.1 - 6.7	5.55	**1.86**	**6.55**	**17.0**	**15.4**	**11.8**	7.33	**12.1**	**15.7**	**2.43**	**37.5**	4.22	**7.09**	0.717	0.660	1.38	**5.68**	16.9	31.7
BH18-07-12	8.4 - 9.0	5.55	**11.8**	**52.9**	**38.2**	**27.6**	**22.4**	8.96	**21.6**	**32.9**	**3.70**	**95.9**	29.7	**11.1**	10.1	2.46	12.6	**6.25**	115	76.0

BH18-10	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-10-3	1.5 - 2.1	0.055	**0.295**	0.433	**2.81**	**2.91**	**3.42**	2.36	**1.37**	2.58	**0.642**	5.07	0.077	**2.44**	0.040	0.049	0.090	0.101	1.42	4.78
BH18-10-11	6.7 - 8.2	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-04	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-04-6	3.8 - 4.4	< 0.050	0.120	0.158	**1.14**	**1.23**	**1.23**	0.648	0.943	1.11	**0.199**	1.68	0.052	0.473	< 0.030	0.041	< 0.042	0.103	0.326	1.55
BH18-04-7	4.6 - 5.2	0.052	**0.239**	0.323	**1.36**	**1.35**	**1.29**	0.823	**1.10**	1.34	**0.245**	2.55	0.112	0.754	0.054	0.074	0.128	0.173	1.31	2.31

BH18-08	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-08-7	4.6 - 5.1	< 0.050	< 0.050	0.064	0.105	0.079	0.083	< 0.050	0.067	0.302	< 0.050	0.232	0.053	< 0.050	< 0.030	< 0.030	< 0.042	0.052	0.235	0.187
BH18-08-8	5.3 - 5.9	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-08-10	6.9 - 7.5	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	0.018	< 0.046	< 0.050
BH18-08-100	6.9 - 7.5	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-09	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-09-6	3.8 - 4.4	< 0.050	< 0.050	< 0.050	0.199	0.211	0.274	0.126	0.183	0.248	< 0.050	0.322	< 0.050	0.146	< 0.030	< 0.030	< 0.042	< 0.013	0.248	0.420
BH18-09-9	6.1 - 6.7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-16	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-16-5/6	3.0 - 4.4	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.057	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	0.048	< 0.050
BH18-16-8	5.3 - 5.9	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.050	< 0.050	< 0.050	< 0.050	0.096	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	0.023	0.069	0.085

PARAMETERS	ABBREVIATION	STANDARDS
ACENAPHTHENE	ANA	7.9
ACENAPHTHYLENE	ANP	0.15
ANTHRACENE	ANTH	0.67
BENZO(A)ANTHRACENE	B(a)A	0.96
BENZO(A)PYRENE	B(a)P	0.3
BENZO(B)FLUORANTHENE	B(b)F	0.96
BENZO(G,H,I)PERYLENE	B(ghi)P	9.6
BENZO(K)FLUORANTHENE	B(k)F	0.96
CHRYSENE	CH	9.6
DIBENZO(A,H)ANTHRACENE	D(ah)A	0.1
FLUORANTHENE	FLAN	9.6
FLUORENE	FL	62
INDENO(1,2,3-CD)PYRENE	IP	0.96
METHYLNAPHTHALENE, 1-	1-MNP	34**
METHYLNAPHTHALENE, 2-	2-MNP	34**
METHYLNAPHTHALENE, 1- & 2-	1&2-MNP	34**
NAPHTHALENE	NP	0.65
PHENANTHRENE	PNT	270
PYRENE	PYR	96

STANDARDS:
- TABLE 5 (2011): STRATIFIED SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION FOR RESIDENTIAL/ PARKLAND/INSTITUTIONAL PROPERTY USE, COARSE TEXTURED SUBSURFACE SOILS (MOE, 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/LITRE (µg/L)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. 'm' : METRES
4. '2018 09 11' : DATE FORMAT YYYY/MM/DD

LEGEND
- BOREHOLE
- BOREHOLE/MONITORING WELL
- SOIL VAPOUR PROBE
- PHASE TWO STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE
- LOCATION WHERE ALL SOIL SAMPLES ANALYSED MET THE SELECTED STANDARD FOR ALL PARAMETERS ANALYSED, SHOWN IN GREEN
- LOCATION WHERE AT LEAST ONE SOIL SAMPLE ANALYSED EXCEEDED THE SELECTED STANDARD FOR AT LEAST ONE PARAMETER ANALYSED, SHOWN IN RED
- GREEN: GREEN COLOURED CONCENTRATION MET THE STANDARD APPLICABLE AT THE TIME OF SAMPLING
- RED: EXCEEDANCES OF STANDARDS, APPLICABLE AT THE TIME OF SAMPLING, SHOWN IN RED

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

BH18-18	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-18-5	3.0 - 3.7	0.059	< 0.050	0.215	0.642	**0.548**	0.560	0.291	0.438	0.637	0.096	1.58	0.144	0.319	< 0.030	< 0.030	< 0.042	0.041	0.665	1.31
BH18-18-12A	8.4 - 8.9	< 0.050	< 0.050	< 0.050	0.217	0.239	0.221	0.121	0.168	0.198	< 0.050	0.211	< 0.050	0.143	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	0.192
BH18-18-122A	8.4 - 8.9	0.051	< 0.050	0.095	0.227	0.218	0.234	0.119	0.171	0.233	< 0.050	0.441	0.078	0.133	< 0.030	0.037	< 0.042	0.064	0.333	0.365

BH18-23	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-23-8	5.3 - 5.9	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-23-13	9.1 - 9.8	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-25	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-25-12	8.4 - 9.0	**11.8**	**2.53**	**18.3**	**25.2**	**24.7**	**20.9**	**13.2**	**15.6**	**25.5**	**4.47**	**64.6**	11.7	**9.92**	4.86	6.33	11.2	**20.1**	65.3	55.0
BH18-25-18	13.0 - 13.4	2.02	0.097	0.239	0.069	0.053	< 0.050	< 0.050	< 0.050	< 0.050	0.084	< 0.050	0.341	3.59	< 0.050	2.00	3.91	5.91	**29.8**	2.07	0.216

BH18-26	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-26-14	9.9 - 10.5	5.91	< 0.088	**1.02**	0.697	**0.374**	0.356	0.203	0.272	0.601	0.070	4.27	4.42	0.344	0.893	0.085	0.976	**1.10**	6.55	2.69
BH18-26-18	13.0 - 13.6	0.929	< 0.050	0.150	0.112	0.064	0.063	< 0.050	< 0.050	0.125	< 0.050	0.564	0.667	< 0.050	0.182	< 0.030	0.182	0.285	1.18	0.376

BH18-27	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-27-6	3.8 - 4.4	**464**	**39.6**	**136**	**74.7**	**47.2**	**62.4**	**23.5**	**23.2**	**60.0**	**6.2**	**361**	**397**	**24.7**	**211**	**450**	**661**	**2,530**	**840**	**223**
BH18-27-66	3.8 - 4.4	4.46	**0.47**	**2.00**	**2.91**	**2.37**	**3.20**	1.33	**1.13**	2.63	**0.34**	8.43	3.89	**4.37**	3.86	5.91	9.76	**84.2**	11.0	6.40
BH18-27-14	9.9 - 10.5	4.62	**0.22**	**1.35**	0.67	**0.42**	0.55	0.25	0.39	0.55	< 0.13	2.92	3.45	0.27	2.70	2.05	4.75	**12.5**	7.03	1.85

BH18-06	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-06-6	3.8 - 4.4	**409**	**13.9**	**130**	**24.2**	**10.3**	**9.0**	< 5.0	**10.9**	**22.0**	< 5.0	**250**	**362**	< 5.0	**207**	**497**	**704**	**2,360**	**705**	**152**
BH18-06-88	5.3 - 5.9	1.34	< 0.095	0.511	0.097	< 0.050	< 0.050	< 0.050	< 0.050	0.089	< 0.050	0.924	1.06	< 0.050	0.331	0.767	1.10	**3.71**	2.66	0.555

BH18-30	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-30-6	3.8 - 4.4	0.085	< 0.050	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.166	0.124	< 0.050	< 0.030	< 0.030	< 0.042	0.027	0.406	0.104
BH18-30-66	3.8 - 4.4	0.086	< 0.050	0.431	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.175	0.439	< 0.050	0.034	< 0.030	< 0.042	0.055	1.38	0.102
BH18-30-7	4.6 - 5.2	0.225	< 0.050	0.292	0.079	< 0.050	0.065	< 0.050	< 0.050	0.065	< 0.050	0.434	0.445	< 0.050	0.040	0.067	0.097	0.166	1.22	0.266

BH18-14	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-14-3	1.5 - 2.1	0.216	< 0.050	0.426	**1.11**	**1.00**	**1.19**	0.764	0.473	1.02	**0.206**	2.74	0.211	0.749	0.196	0.197	0.393	0.182	2.14	2.28
BH18-14-7	4.6 - 5.1	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-14-77	4.6 - 5.1	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-15	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-15-4	2.3 - 2.9	< 0.050	0.067	0.055	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.142	< 0.050	0.083	0.183	< 0.050	1.91	0.096	2.01	< 0.050	1.74	0.114

BH18-12	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-12-3	1.5 - 2.1	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-13	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-13-4	2.3 - 3.0	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-05	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-05-5	3.0 - 3.7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050
BH18-05-55	3.0 - 3.7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	< 0.013	< 0.046	< 0.050

BH18-17	Sample Depth	ANA	ANP	ANTH	B(a)A	B(a)P	B(b)F	B(ghi)P	B(k)F	CH	D(ah)A	FLAN	FL	IP	1-MNP	2-MNP	1&2-MNP	NP	PNT	PYR
BH18-17-6	3.8 - 4.4	0.191	**0.306**	0.287	0.657	**0.505**	0.782	0.425	0.294	0.708	**0.135**	2.10	0.228	0.441	0.756	1.20	1.96	**5.50**	1.32	1.83
BH18-17-9	6.1 - 6.7	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.085	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	0.079	0.057	0.079
BH18-17-11	7.6 - 8.2	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	0.029	< 0.046	< 0.050
BH18-17-111	7.6 - 8.2	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.091	< 0.050	< 0.050	0.040	0.049	0.089	0.107	0.115	0.080
BH18-17-13/14	9.1 - 10.5	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.030	< 0.030	< 0.042	0.031	< 0.046	< 0.050

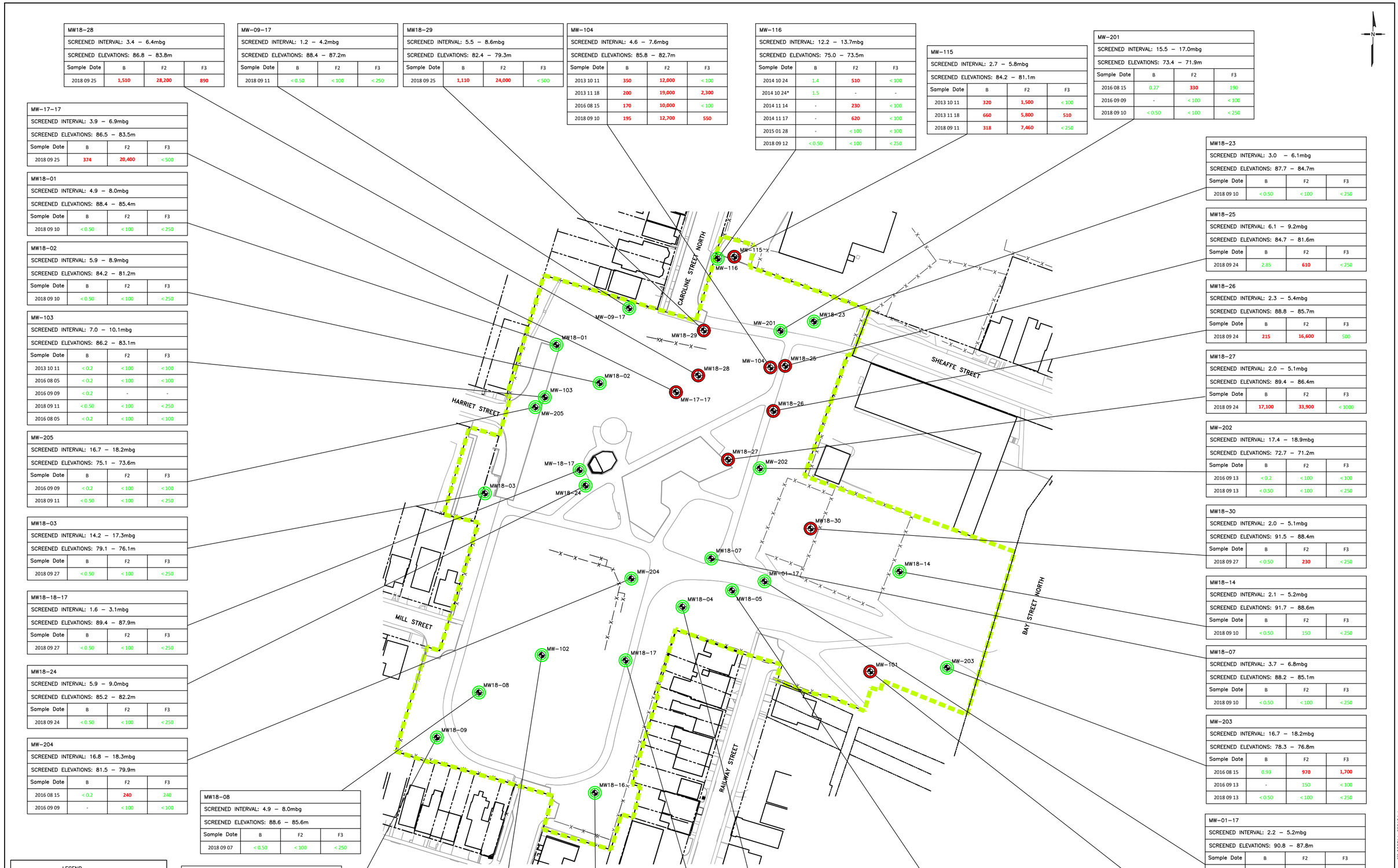
SCALE 1:1,000
0 20 40m

SNC·LAVALIN

Client/Location:	CITY OF HAMILTON CENTRAL PARK, HAMILTON, ON
Project No:	655184
Filename:	005F13_655184
Drawn:	AG
Verified:	LB
Project Manager:	LB
Title:	SUBSURFACE SOIL ANALYTICAL RESULTS FOR SELECT PAHs
Date:	NOVEMBER 2018
Dwg No:	FIGURE 13

PAGE FORMAT: 22x34

FILENAME: \\SH1021\Projects\ANA\Central Park\655184\AS_Execution\AT_dwg_ver\CAD_GIS\005 (2018 Phase 2)\005F13_655184.dwg



MW18-28

SCREENED INTERVAL: 3.4 – 6.4mbg

SCREENED ELEVATIONS: 86.8 – 83.8m

Sample Date	B	F2	F3
2018 09 25	1,510	28,200	890

MW-09-17

SCREENED INTERVAL: 1.2 – 4.2mbg

SCREENED ELEVATIONS: 88.4 – 87.2m

Sample Date	B	F2	F3
2018 09 11	< 0.50	< 100	< 250

MW18-29

SCREENED INTERVAL: 5.5 – 8.6mbg

SCREENED ELEVATIONS: 82.4 – 79.3m

Sample Date	B	F2	F3
2018 09 25	1,110	24,000	< 500

MW-104

SCREENED INTERVAL: 4.6 – 7.6mbg

SCREENED ELEVATIONS: 85.8 – 82.7m

Sample Date	B	F2	F3
2013 10 11	350	12,000	< 100
2013 11 18	200	19,000	2,300
2016 08 15	170	10,000	< 100
2018 09 10	195	12,700	550

MW-116

SCREENED INTERVAL: 12.2 – 13.7mbg

SCREENED ELEVATIONS: 75.0 – 73.5m

Sample Date	B	F2	F3
2014 10 24	1.4	510	< 100
2014 10 24*	1.5	-	-
2014 11 14	-	230	< 100
2014 11 17	-	620	< 100
2015 01 28	-	< 100	< 100
2018 09 12	< 0.50	< 100	< 250

MW-115

SCREENED INTERVAL: 2.7 – 5.8mbg

SCREENED ELEVATIONS: 84.2 – 81.1m

Sample Date	B	F2	F3
2013 10 11	320	1,500	< 100
2013 11 18	660	5,800	510
2018 09 11	318	7,460	< 250

MW-201

SCREENED INTERVAL: 15.5 – 17.0mbg

SCREENED ELEVATIONS: 73.4 – 71.9m

Sample Date	B	F2	F3
2016 08 15	0.27	330	190
2016 09 09	-	< 100	< 100
2018 09 10	< 0.50	< 100	< 250

MW-17-17

SCREENED INTERVAL: 3.9 – 6.9mbg

SCREENED ELEVATIONS: 86.5 – 83.5m

Sample Date	B	F2	F3
2018 09 25	374	20,400	< 500

MW18-01

SCREENED INTERVAL: 4.9 – 8.0mbg

SCREENED ELEVATIONS: 88.4 – 85.4m

Sample Date	B	F2	F3
2018 09 10	< 0.50	< 100	< 250

MW18-02

SCREENED INTERVAL: 5.9 – 8.9mbg

SCREENED ELEVATIONS: 84.2 – 81.2m

Sample Date	B	F2	F3
2018 09 10	< 0.50	< 100	< 250

MW-103

SCREENED INTERVAL: 7.0 – 10.1mbg

SCREENED ELEVATIONS: 86.2 – 83.1m

Sample Date	B	F2	F3
2013 10 11	< 0.2	< 100	< 100
2016 08 05	< 0.2	< 100	< 100
2016 09 09	< 0.2	-	-
2018 09 11	< 0.50	< 100	< 250
2016 08 05	< 0.2	< 100	< 100

MW-205

SCREENED INTERVAL: 16.7 – 18.2mbg

SCREENED ELEVATIONS: 75.1 – 73.6m

Sample Date	B	F2	F3
2016 09 09	< 0.2	< 100	< 100
2018 09 11	< 0.50	< 100	< 250

MW18-03

SCREENED INTERVAL: 14.2 – 17.3mbg

SCREENED ELEVATIONS: 79.1 – 76.1m

Sample Date	B	F2	F3
2018 09 27	< 0.50	< 100	< 250

MW18-18-17

SCREENED INTERVAL: 1.6 – 3.1mbg

SCREENED ELEVATIONS: 89.4 – 87.9m

Sample Date	B	F2	F3
2018 09 27	< 0.50	< 100	< 250

MW18-24

SCREENED INTERVAL: 5.9 – 9.0mbg

SCREENED ELEVATIONS: 85.2 – 82.2m

Sample Date	B	F2	F3
2018 09 24	< 0.50	< 100	< 250

MW-204

SCREENED INTERVAL: 16.8 – 18.3mbg

SCREENED ELEVATIONS: 81.5 – 79.9m

Sample Date	B	F2	F3
2016 08 15	< 0.2	240	240
2016 09 09	-	< 100	< 100

MW18-23

SCREENED INTERVAL: 3.0 – 6.1mbg

SCREENED ELEVATIONS: 87.7 – 84.7m

Sample Date	B	F2	F3
2018 09 10	< 0.50	< 100	< 250

MW18-25

SCREENED INTERVAL: 6.1 – 9.2mbg

SCREENED ELEVATIONS: 84.7 – 81.6m

Sample Date	B	F2	F3
2018 09 24	2.85	610	< 250

MW18-26

SCREENED INTERVAL: 2.3 – 5.4mbg

SCREENED ELEVATIONS: 88.8 – 85.7m

Sample Date	B	F2	F3
2018 09 24	215	16,600	500

MW18-27

SCREENED INTERVAL: 2.0 – 5.1mbg

SCREENED ELEVATIONS: 89.4 – 86.4m

Sample Date	B	F2	F3
2018 09 24	17,100	33,900	< 1000

MW-202

SCREENED INTERVAL: 17.4 – 18.9mbg

SCREENED ELEVATIONS: 72.7 – 71.2m

Sample Date	B	F2	F3
2016 09 13	< 0.2	< 100	< 100
2018 09 13	< 0.50	< 100	< 250

MW18-30

SCREENED INTERVAL: 2.0 – 5.1mbg

SCREENED ELEVATIONS: 91.5 – 88.4m

Sample Date	B	F2	F3
2018 09 27	< 0.50	230	< 250

MW18-14

SCREENED INTERVAL: 2.1 – 5.2mbg

SCREENED ELEVATIONS: 91.7 – 88.6m

Sample Date	B	F2	F3
2018 09 10	< 0.50	150	< 250

MW18-07

SCREENED INTERVAL: 3.7 – 6.8mbg

SCREENED ELEVATIONS: 88.2 – 85.1m

Sample Date	B	F2	F3
2018 09 10	< 0.50	< 100	< 250

MW-203

SCREENED INTERVAL: 16.7 – 18.2mbg

SCREENED ELEVATIONS: 78.3 – 76.8m

Sample Date	B	F2	F3
2016 08 15	0.93	970	1,700
2016 09 13	-	150	< 100
2018 09 13	< 0.50	< 100	< 250

MW-01-17

SCREENED INTERVAL: 2.2 – 5.2mbg

SCREENED ELEVATIONS: 90.8 – 87.8m

Sample Date	B	F2	F3
2018 09 11	< 0.50	< 100	< 250

MW-101

SCREENED INTERVAL: 5.3 – 8.4mbg

SCREENED ELEVATIONS: 90.7 – 87.7m

Sample Date	B	F2	F3
2013 10 11	< 0.2	280	340
2016 08 04	< 0.2	< 100	< 100
2018 09 11	< 0.50	210	< 250
2013 10 11	< 0.2	340	340

MW18-08

SCREENED INTERVAL: 4.9 – 8.0mbg

SCREENED ELEVATIONS: 88.6 – 85.6m

Sample Date	B	F2	F3
2018 09 07	< 0.50	< 100	< 250

MW18-09

SCREENED INTERVAL: 5.0 – 8.1mbg

SCREENED ELEVATIONS: 89.2 – 86.2m

Sample Date	B	F2	F3
2018 09 07	< 0.50	< 100	< 250

MW-102

SCREENED INTERVAL: 2.1 – 5.2mbg

SCREENED ELEVATIONS: 90.1 – 87.1m

Sample Date	B	F2	F3
2013 10 11	< 0.40	< 100	< 100
2016 08 04	< 0.2	< 100	< 100
2018 09 12	< 0.50	< 100	< 250

MW18-16

SCREENED INTERVAL: 4.0 – 7.1mbg

SCREENED ELEVATIONS: 90.3 – 87.3m

Sample Date	B	F2	F3
2018 09 07	< 0.50	< 100	< 250

MW18-17

SCREENED INTERVAL: 5.2 – 8.3mbg

SCREENED ELEVATIONS: 87.4 – 84.3m

Sample Date	B	F2	F3
2018 09 07	< 0.50	< 100	< 250
2018 09 12	< 0.50	< 100	< 250

MW18-04

SCREENED INTERVAL: 2.4 – 5.4mbg

SCREENED ELEVATIONS: 90.7 – 87.7m

Sample Date	B	F2	F3
2018 09 07	< 0.50	< 100	< 250

MW18-05

SCREENED INTERVAL: 2.9 – 6.0mbg

SCREENED ELEVATIONS: 89.5 – 86.5m

Sample Date	B	F2	F3
2018 09 10	< 0.50	< 100	< 250

LEGEND

- MONITORING WELL
- PHASE TWO STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE
- LOCATION WHERE MOST RECENT GROUNDWATER SAMPLE MET STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED, SHOWN IN GREEN
- LOCATION WHERE MOST RECENT GROUNDWATER SAMPLE EXCEEDED STANDARDS FOR AT LEAST ONE PARAMETER THAT WAS ANALYSED, SHOWN IN RED
- GREEN — GREEN COLOURED CONCENTRATION MET THE STANDARD APPLICABLE AT THE TIME OF SAMPLING
- RED — EXCEEDANCES OF STANDARDS, APPLICABLE AT THE TIME OF SAMPLING, SHOWN IN RED

PARAMETERS	ABBREVIATION	STANDARDS
BENZENE	B	44
PHC F2	F2	150
PHC F2	F3	500

STANDARDS:

- TABLE 3 (2011): FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION FOR ALL TYPES OF PROPERTY USE, COARSE TEXTURED SOILS (MOE, 2011)

GENERAL NOTES:

1. ALL CONCENTRATIONS IN MICROGRAMS/LITRE (µg/L)
2.
3. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
4. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
5. 'VOC' : VOLATILE ORGANIC COMPOUNDS
6. 'm' : METRES
7. '2018 09 11' : DATE FORMAT YYYY/MM/DD

NOTE(S):

1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

SNC·LAVALIN

Client/Location: CITY OF HAMILTON
CENTRAL PARK,
HAMILTON, ON

Title: GROUNDWATER ANALYTICAL RESULTS FOR SELECT BTEX PHCs

Project No:	Filename:	Date:	Dwg No:
655184	005F14_655184	NOVEMBER 2018	FIGURE 14
Drawn: AG	Verified: LB	Project Manager: LB	

FILENAME: P:\HAM\Central Park\655184\40_Execution\47_Wrkg_Vers\CAD_GIS\005 (2018 Phase 2)\005F14_655184.dwg

PAGE FORMAT: 17x22

MW18-28

SCREENED INTERVAL: 3.4 – 6.4mbg

SCREENED ELEVATIONS: 86.8 – 83.8m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 25	139	1.44	**0.850**	0.197	0.254	**0.298**	**10,500**

MW-09-17

SCREENED INTERVAL: 1.2 – 4.2m

SCREENED ELEVATIONS: 87.2 – 84.2m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 11	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050

MW18-29

SCREENED INTERVAL: 5.5 – 8.6mbg

SCREENED ELEVATIONS: 82.4 – 79.3m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 25	193	1.74	0.048	< 0.020	< 0.020	< 0.020	**8,740**

MW-104

SCREENED INTERVAL: 4.6 – 7.6mbg

SCREENED ELEVATIONS: 85.8 – 82.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2013 10 11	370	**19**	< 0.1	< 0.2	< 0.1	< 0.2	**12,000**
2013 11 18	310	**7.4**	< 0.1	< 0.2	< 0.1	< 0.2	**14,000**
2016 08 15	270	< 0.2	0.57	**0.27**	0.27	0.2	**10,000**
2018 09 10	219	**2.32**	0.132	0.037	0.043	0.049	**8,880**

MW-116

SCREENED INTERVAL: 12.2 – 13.7mbg

SCREENED ELEVATIONS: 75.0 – 73.5m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2014 10 24	36	1.4	< 0.1	< 0.2	< 0.1	< 0.2	30
2015 01 28	< 0.2	0.41	< 0.1	< 0.2	< 0.1	< 0.2	< 0.2
2018 09 12	2.46	0.065	0.082	0.036	0.033	0.042	0.286

MW-115

SCREENED INTERVAL: 2.7 – 5.8mbg

SCREENED ELEVATIONS: 84.2 – 81.1m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2013 10 11	58	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	**1,500**
2013 11 18	80	0.43	< 0.1	< 0.2	< 0.1	< 0.2	**2,900**
2018 09 11	152	0.852	< 0.020	< 0.020	< 0.020	< 0.020	**5,520**

MW-201

SCREENED INTERVAL: 15.5 – 17.0mbg

SCREENED ELEVATIONS: 73.4 – 71.9m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2016 08 15	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	1.1
2018 09 10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.125

MW18-23

SCREENED INTERVAL: 3.0 – 6.1mbg

SCREENED ELEVATIONS: 87.7 – 84.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	4.31	0.040	< 0.020	< 0.020	< 0.020	< 0.020	0.122

MW18-25

SCREENED INTERVAL: 3.0 – 6.1mbg

SCREENED ELEVATIONS: 87.7 – 84.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 24	30.0	**5.59**	0.250	0.094	0.083	0.120	327

MW18-26

SCREENED INTERVAL: 2.3 – 5.4mbg

SCREENED ELEVATIONS: 88.8 – 85.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 24	**646**	**2.27**	0.194	0.054	0.061	0.070	**10,400**

MW18-27

SCREENED INTERVAL: 2.0 – 5.1mbg

SCREENED ELEVATIONS: 89.4 – 86.4m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 24	571	**61.2**	0.262	0.045	0.083	0.066	**22,900**

MW-202

SCREENED INTERVAL: 17.4 – 18.9mbg

SCREENED ELEVATIONS: 72.7 – 71.2m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2016 09 13	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	8.3
2018 09 13	0.099	0.093	0.554	0.148	0.182	**0.212**	1.37

MW18-30

SCREENED INTERVAL: 2.0 – 5.1mbg

SCREENED ELEVATIONS: 91.5 – 88.4m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 27	4.87	0.112	0.024	< 0.020	< 0.020	< 0.020	6.06

MW18-07

SCREENED INTERVAL: 3.7 – 6.8mbg

SCREENED ELEVATIONS: 88.2 – 85.1m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	0.684	1.47	0.065	0.020	0.026	0.029	2.70

MW18-14

SCREENED INTERVAL: 2.1 – 5.2mbg

SCREENED ELEVATIONS: 91.7 – 88.6m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	< 0.030	< 0.030	< 0.020	< 0.020	< 0.020	< 0.020	0.614

MW-01-17

SCREENED INTERVAL: 2.2 –5.2mbg

SCREENED ELEVATIONS: 90.8 – 87.8m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 11	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050

MW18-05

SCREENED INTERVAL: 2.9 – 6.0mbg

SCREENED ELEVATIONS: 89.5 – 86.5m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050

MW-203

SCREENED INTERVAL: 16.7 – 18.2mbg

SCREENED ELEVATIONS: 78.3 – 76.8m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2016 08 15	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	1.9
2018 09 13	< 0.020	< 0.020	0.044	0.023	< 0.020	0.027	< 0.050

MW-101

SCREENED INTERVAL: 5.3 – 8.4mbg

SCREENED ELEVATIONS: 90.7 – 87.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2013 10 11	0.39	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	1.3
2013 10 11*	0.43	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	1.4
2016 08 04	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	0.71
2018 09 11	< 0.15	0.038	< 0.020	< 0.020	< 0.020	< 0.020	< 0.58

MW18-04

SCREENED INTERVAL: 2.4 – 5.4mbg

SCREENED ELEVATIONS: 90.7 – 87.7m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 07	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050

MW-17-17

SCREENED INTERVAL: 3.9 – 6.9mbg

SCREENED ELEVATIONS: 85.47 – 83.47m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 25	154	**2.81**	0.116	0.027	0.040	0.038	**7,710**

MW18-01

SCREENED INTERVAL: 4.9 – 8.0mbg

SCREENED ELEVATIONS: 88.4 – 85.4m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	0.031	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.078

MW18-02

SCREENED INTERVAL: 5.9 – 8.9mbg

SCREENED ELEVATIONS: 84.2 – 81.2m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.054

MW-103

SCREENED INTERVAL: 7.0 – 10.1mbg

SCREENED ELEVATIONS: 86.2 – 83.1m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2013 10 11	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	2.9
2016 08 05	0.35	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	2.1
2018 09 11	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050
2016 08 05	0.42	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	2

MW-205

SCREENED INTERVAL: 16.7 – 18.2mbg

SCREENED ELEVATIONS: 75.1 – 73.6m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2016 09 09	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	< 0.2
2018 09 11	< 0.020	< 0.020	< 0.020	< 0.020	< 0.030	< 0.020	0.139

MW-18-17

SCREENED INTERVAL: 5.2 – 8.3mbg

SCREENED ELEVATIONS: 87.4 – 84.3m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 07	0.024	0.039	< 0.020	< 0.020	< 0.020	< 0.020	4.23
2018 09 12	< 0.020	< 0.020	0.108	0.057	0.037	0.074	0.066

MW18-03

SCREENED INTERVAL: 14.2 – 17.3mbg

SCREENED ELEVATIONS: 79.1 – 76.1m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 27	0.040	< 0.020	0.024	< 0.020	< 0.020	< 0.020	0.061

MW18-24

SCREENED INTERVAL: 5.9 – 9.0mbg

SCREENED ELEVATIONS: 85.2 – 82.2m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 24	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.094

MW-204

SCREENED INTERVAL: 16.8 – 18.3mbg

SCREENED ELEVATIONS: 81.5 – 79.9m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2016 08 15	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	< 0.2

MW-102

SCREENED INTERVAL: 2.1 – 5.2mbg

SCREENED ELEVATIONS: 90.1 – 87.1m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2013 10 11	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	0.44
2016 08 04	< 0.2	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	< 0.2
2018 09 12	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.050

MW18-08

SCREENED INTERVAL: 4.9 – 8.0mbg

SCREENED ELEVATIONS: 88.6 – 85.6m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 07	0.180	0.043	< 0.020	< 0.020	< 0.020	< 0.020	2.47

MW18-09

SCREENED INTERVAL: 5.0 – 8.1mbg

SCREENED ELEVATIONS: 89.2 – 86.2m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 07	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.164

MW18-17

SCREENED INTERVAL: 5.2 – 8.3mbg

SCREENED ELEVATIONS: 87.4 – 84.3m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 27	0.024	0.039	<0.020	< 0.020	< 0.020	< 0.020	4.23

MW18-16

SCREENED INTERVAL: 4.0 – 7.1mbg

SCREENED ELEVATIONS: 90.3 – 87.3m

Sample Date	ANA	ANP	B(b)F	B(ghi)P	B(k)F	IP	NP
2018 09 07	1.43	0.283	0.078	0.035	0.027	0.042	8.08

LEGEND

- MONITORING WELL
- PHASE TWO STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE
- LOCATION WHERE MOST RECENT GROUNDWATER SAMPLE MET STANDARDS FOR ALL PARAMETERS THAT WERE ANALYSED, SHOWN IN GREEN
- LOCATION WHERE MOST RECENT GROUNDWATER SAMPLE EXCEEDED STANDARDS FOR AT LEAST ONE PARAMETER THAT WAS ANALYSED, SHOWN IN RED
- GREEN — GREEN COLOURED CONCENTRATION MET THE STANDARD APPLICABLE AT THE TIME OF SAMPLING
- RED — EXCEEDANCES OF STANDARDS, APPLICABLE AT THE TIME OF SAMPLING, SHOWN IN RED

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE.
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

PARAMETERS	ABBREVIATION	STANDARDS
ACENAPHTHENE	ANA	600
ACENAPHTHYLENE	ANP	1.8
BENZO(B)FLUORANTHENE	B(b)F	0.75
BENZO(G,H,I)PERYLENE	B(ghi)P	0.2
BENZO(K)FLUORANTHENE	B(k)F	0.4
INDENO(1,2,3-CD)PYRENE	IP	0.2
NAPHTHALENE	NP	1400

STANDARDS:
- TABLE 3 (2011): FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION FOR ALL TYPES OF PROPERTY USE, COARSE TEXTURED SOILS (MOE, 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/LITRE (µg/L)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'm' : METRES
5. '2018 09 11' : DATE FORMAT YYYY/MM/DD

SCALE 1:1,000

0 20 40m

SNC·LAVALIN

Client/Location: CITY OF HAMILTON CENTRAL PARK, HAMILTON, ON	Title: GROUNDWATER ANALYTICAL RESULTS FOR SELECT PAHs
Project No: 655184	Filename: 005F15_655184
Drawn: AC	Verified: LB
Date: NOVEMBER 2018	Dwg No: FIGURE 15
Project Manager: LB	

PAGE FORMAT: 22x34

FILENAME: P:\WM\Control Trunk\655184\GIS_Execution\47_dwg\Work\GAL_005.005 (2018 Phase 2)\005F15_655184.dwg

MW-09-17	
SCREENED INTERVAL: 1.2 – 4.2mbg	
SCREENED ELEVATIONS: 87.2 – 84.2m	
SAMPLE DATE	TCE
2018 09 11	< 0.50

MW-104	
SCREENED INTERVAL: 4.6 – 7.6mbg	
SCREENED ELEVATIONS: 85.8 – 82.7m	
SAMPLE DATE	TCE
2013 10 11	< 2.00
2013 11 18	< 0.2
2016 08 15	< 0.2
2018 09 10	< 0.50

MW-116	
SCREENED INTERVAL: 12.2 – 13.7mbg	
SCREENED ELEVATIONS: 75.0 – 73.5m	
SAMPLE DATE	TCE
2014 10 24	< 0.2
2018 09 12	< 0.50
2014 10 24	< 0.2

MW-115	
SCREENED INTERVAL: 2.7 – 5.8mbg	
SCREENED ELEVATIONS: 84.2 – 81.1m	
SAMPLE DATE	TCE
2013 10 11	< 2.00
2013 11 18	< 0.80
2018 09 11	< 0.50

MW-201	
SCREENED INTERVAL: 15.5 – 17.0mbg	
SCREENED ELEVATIONS: 73.4 – 71.9m	
SAMPLE DATE	TCE
2016 08 15	< 0.2
2018 09 10	< 0.50

MW18-01	
SCREENED INTERVAL: 4.9 – 8.0mbg	
SCREENED ELEVATIONS: 88.4 – 85.4m	
SAMPLE DATE	TCE
2018 09 10	< 0.50

MW18-02	
SCREENED INTERVAL: 5.9 – 8.9mbg	
SCREENED ELEVATIONS: 84.2 – 81.2m	
SAMPLE DATE	TCE
2018 09 10	< 0.50

MW-103	
SCREENED INTERVAL: 7.0 – 10.1mbg	
SCREENED ELEVATIONS: 86.2 – 83.1m	
SAMPLE DATE	TCE
2013 10 11	**12**
2016 09 09	**7.6**
2018 09 11	**1.64**

MW-205	
SCREENED INTERVAL: 16.7 – 18.2mbg	
SCREENED ELEVATIONS: 75.1 – 73.6m	
SAMPLE DATE	TCE
2016 09 09	< 0.2
2018 09 11	< 0.50

MW-17-17	
SCREENED INTERVAL: 3.9 – 6.9mbg	
SCREENED ELEVATIONS: 86.5 – 83.5m	
SAMPLE DATE	TCE
2018 09 25	< 0.50

MW18-03	
SCREENED INTERVAL: 14.2 – 17.3mbg	
SCREENED ELEVATIONS: 79.1 – 76.1m	
SAMPLE DATE	TCE
2018 09 27	< 0.50

MW-18-17

SCREENED INTERVAL: 5.2 – 8.3ml

MW-102	
SCREENED INTERVAL: 2.1 – 5.2mbg	
SCREENED ELEVATIONS: 90.1 – 87.1m	
SAMPLE DATE	TCE
2013 10 11	< 0.40
2016 08 04	< 0.2
2018 09 12	< 0.50

MW18-09	
SCREENED INTERVAL: 5.0 – 8.1mbg	
SCREENED ELEVATIONS: 89.2 – 86.2m	
SAMPLE DATE	TCE
2018 09 07	< 0.50

MW18-08	
SCREENED INTERVAL: 4.9 – 8.0mbg	
SCREENED ELEVATIONS: 88.6 – 85.6m	
SAMPLE DATE	TCE
2018 09 07	< 0.50

MW18-16	
SCREENED INTERVAL: 4.0 – 7.1mbg	
SCREENED ELEVATIONS: 90.3 – 87.3m	
SAMPLE DATE	TCE
2018 09 07	< 0.50

MW-204	
SCREENED INTERVAL: 16.8 – 18.3mbg	
SCREENED ELEVATIONS: 81.5 – 79.9m	
SAMPLE DATE	TCE
2016 08 15	< 0.2

MW18-04	
SCREENED INTERVAL: 2.4 – 5.4mbg	
SCREENED ELEVATIONS: 90.7 – 87.7m	
SAMPLE DATE	TCE
2018 09 07	**2.95**

MW18-05	
SCREENED INTERVAL: 2.9 – 6.0mbg	
SCREENED ELEVATIONS: 89.5 – 86.5m	
SAMPLE DATE	TCE
2018 09 10	0.56

MW-202	
SCREENED INTERVAL: 17.4 – 18.9mbg	
SCREENED ELEVATIONS: 72.7 – 71.2m	
SAMPLE DATE	TCE
2016 09 13	< 0.2
2018 09 13	< 0.50

MW18-14	
SCREENED INTERVAL: 2.1 – 5.2mbg	
SCREENED ELEVATIONS: 91.7 – 88.6m	
SAMPLE DATE	TCE
2018 09 10	< 0.50

MW18-07	
SCREENED INTERVAL: 3.7 – 6.8mbg	
SCREENED ELEVATIONS: 88.2 – 85.1m	
SAMPLE DATE	TCE
2018 09 10	0.64

MW-01-17	
SCREENED INTERVAL: 2.2 – 5.2mbg	
SCREENED ELEVATIONS: 90.8 – 87.8m	
SAMPLE DATE	TCE
2018 09 11	< 0.50

MW-101	
SCREENED INTERVAL: 5.3 – 8.4mbg	
SCREENED ELEVATIONS: 90.7 – 87.7m	
SAMPLE DATE	TCE
2013 10 11	< 0.2
2013 10 11	< 0.2
2016 08 04	< 0.2
2018 09 11	< 0.50

LEGEND

- MONITORING WELL
- PHASE TWO STUDY AREA
- PROPERTY LINE
- INFRASTRUCTURE
- EXISTING BUILDING
- FENCE LINE

GREEN

RED

NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS

PARAMETERS	ABBREVIATION	STANDARDS
TRICHLOROETHYLENE	TCE	1.6

STANDARDS:
- TABLE 5 (2011): STRATIFIED SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION FOR ALL TYPES OF PROPERTY USE, COARSE TEXTURED SOILS (MOE, 2011)

GENERAL NOTES:
1. ALL CONCENTRATIONS IN MICROGRAMS/LITRE (µg/L)
2. '<' : LESS THAN ROUTINE REPORTABLE DETECTION LIMIT APPLICABLE AT THE TIME OF REPORTING
3. '*' : FIELD DUPLICATE OF PREVIOUSLY LISTED SAMPLE
4. 'm' : METRES
5. '2018 09 11' : DATE FORMAT YYYY/MM/DD

SNC·LAVALIN

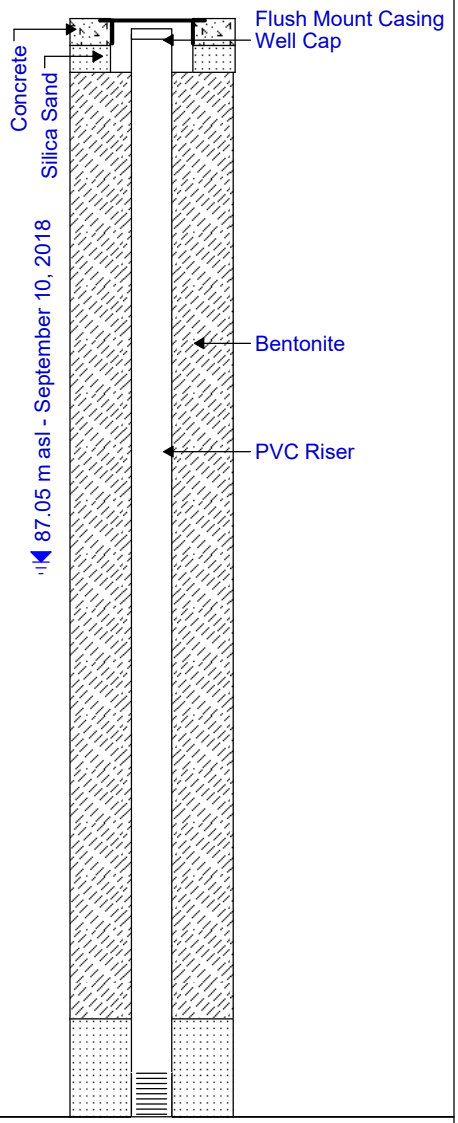
Borehole/Monitoring Well ID: BH18-02 (MW18-02)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 29, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	90.10
0 / 0							SAND FILL dry to moist, dark brown / red, trace silt and clay, fine	
1	2-4-6-12	BH18-02-1		<5/<5	66			
2								
3 / 1	5-12-11-41	BH18-02-2	◆	<5/<5	80		black sheen staining from 1.2 mbgs to 1.4 m bgs	89.00
4								
5	5-7-6-4	BH18-02-3A		<5/<5	100			
6		BH18-02-3B		<5/<5				
7 / 2								88.00
8							silty SAND FILL moist, brown, fine	
9	4-4-3-4	BH18-02-4		<5/<5	62			
10 / 3								87.00
11	1-2-1-1	BH18-02-5	◆	<5/<5	52			
12								
13 / 4								86.00
14	5-7-3-4	BH18-02-6	◆	<5/<5	56			
15								
16 / 5	2-4-7-5	BH18-02-7		<5/<5	98			85.00
17								
18	6-12-8-13	BH18-02-8		<5/<5	100		sandy SILT and CLAY wet, dark brown, fine	
19								
20 / 6								84.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

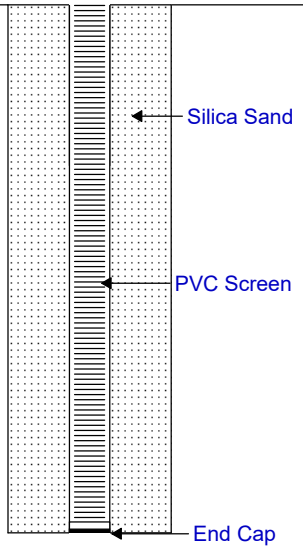
Borehole/Monitoring Well ID: BH18-02 (MW18-02)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 29, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21								
22	4-13-13-6	BH18-02-9	◆	<5/<5	64		dark brown / grey, fine	
23	7							
24	5-5-3-4	BH18-02-10		<5/<5	100		CLAY and SILT wet, dark brown / grey, fine	83.00
25								
26	4-3-4-3	BH18-02-11		<5/<5	100			
27	8							82.00
28								
29	2-5-6-12	BH18-02-12	◆	<5/<5	85		silty SAND wet, dark brown / grey, some clay	
30	9							81.00
31							End of borehole at 9.0 mbgs	
32								
33	10							80.00
34								
35								
36	11							79.00
37								
38								
39	12							78.00
40								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

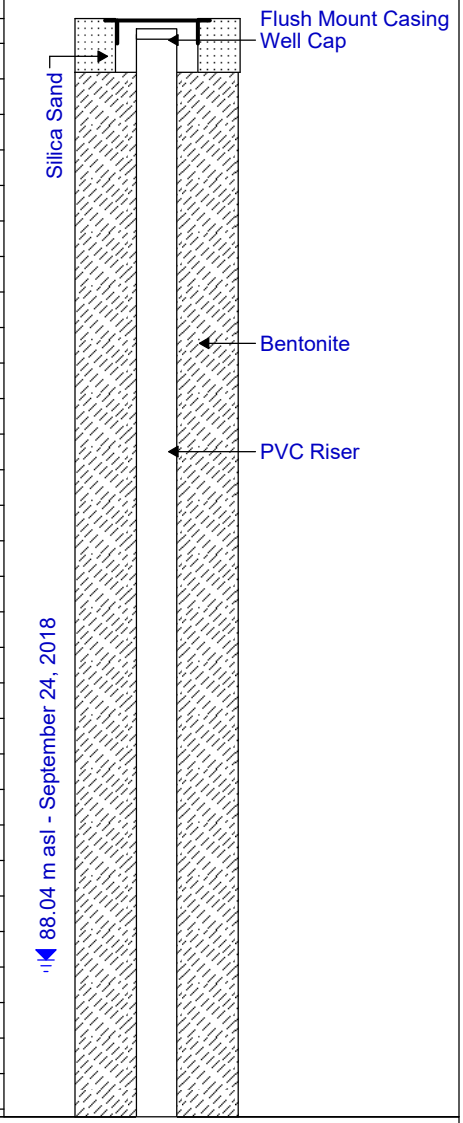
Borehole/Monitoring Well ID: BH18-03 (MW18-03)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 17, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	93.34
0–2 / 0–1	3-3-2-2	BH18-03-1		<5/<5	100		TOPSOIL dry, light brown, trace sand	93.00
2–4 / 1	3-3-2-4	BH18-03-2	◆	<5/<5	89		some sand	
4–6 / 1–2	3-4-6-11	BH18-03-3	◆	<5/<5	100		SAND FILL dry, light brown, trace silt	92.00
6–8 / 2	6-6-4-4	BH18-03-4		<5/<5	100		light brown / red, some silt	91.00
8–10 / 2–3							trace clay	
10–12 / 3	1-2-10-9	BH18-03-5		<5/<5	79			90.00
12–14 / 4	5-6-11-5	BH18-03-6	◆	<5/<5	72		moist, light brown / red, some silt	89.00
14–16 / 4–5	6-9-12-16	BH18-03-7	◆	<5/<5	100		silty CLAY moist to wet, light brown / red, trace sand, black staining (sheen) from 5.0 m bgs to 5.1 m bgs	88.00
16–18 / 5	4-10-11-14	BH18-03-8		<5/<5	72		SAND wet, dark brown, some silt, trace clay	
18–20 / 6								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-03 (MW18-03)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 17, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21							SAND and GRAVEL wet, dark brown / red, some silt	87.00
21	1-1-1-7	BH18-03-9	◆	<5/<5	72			
22							gravelly SILT	
23	7						SAND wet, dark grey	
23	4-2-4-6	BH18-03-10		<5/<5	89			
24							dark red / brown trace silt	86.00
25								
26	8						clayey SILT wet, brown / red / grey	
26	12-17-28-40	BH18-03-11		<5/<5	100			
27								
28							CLAY, SILT, and SAND wet, red / grey	85.00
28	10-12-20-20	BH18-03-12	◆	<5/<5	100			
29								
30	9							
31							SAND and SILT wet, dark brown / red	84.00
31	16-16-31-34	BH18-03-13		<5/<5	100			
32								
33	10						clayey SAND and SILT wet, dark brown / red	
34	6-5-11-14	BH18-03-14		<5/<5	100			83.00
35								
36	11						dark brown / red / grey	
36	5-23-23-30	BH18-03-15		<5/<5	100			
37								82.00
38								
39	12							
39	19-15-17-17	BH18-03-16		<5/<5	100			
40								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

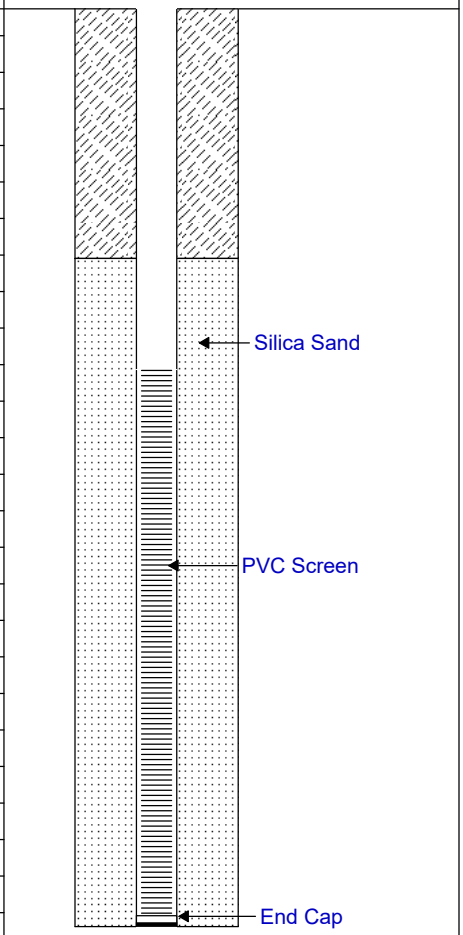
Borehole/Monitoring Well ID: BH18-03 (MW18-03)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 17, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
41	4-6-7-8	BH18-03-17		<5/<5	100			81.00
42							CLAY trace silt	
43	6-12-14-13	BH18-03-18		<5/<5	100		wet, dark grey, trace silt, some sand	80.00
44								
45	4-4-4-7	BH18-03-19		<5/<5	100		light grey	
46								
47								79.00
48	0-0-1-3	BH18-03-20	◆	<5/<5	100			
49								
50	0-0-2-3	BH18-03-21	◆	<5/<5	100			78.00
51								
52	0-0-1-2	BH18-03-22	◆	<5/<5	100			
53								
54								77.00
55	0-0-3-4	BH18-03-23	◆	<5/<5	100			
56								
57								76.00
58							End of Borehole at 17.4 m bgs.	
59								
60								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

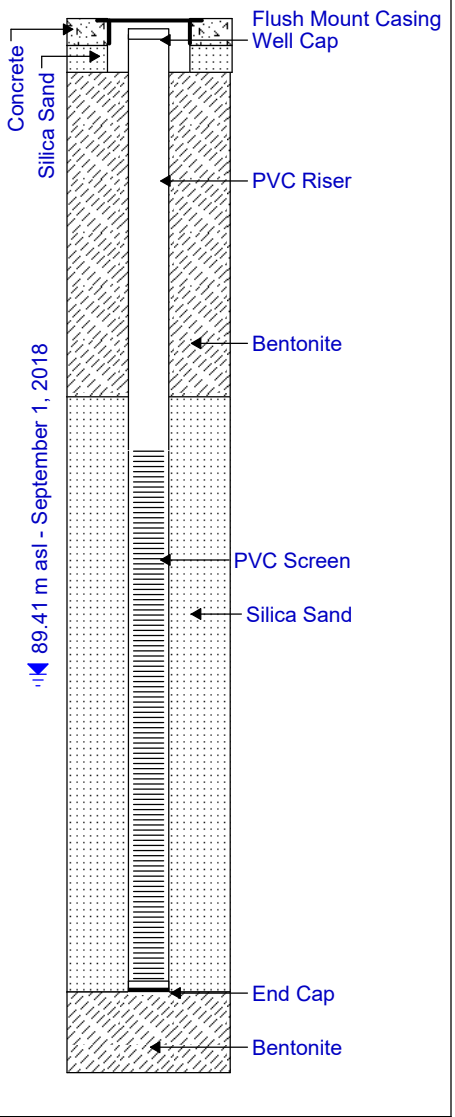
Borehole/Monitoring Well ID: BH18-04 (MW18-04)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 30, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR/ JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	93.10
0–3 ft / 0–1 m	5-7-8-9	BH18-04-1	◆	<5/<5	93		SAND FILL dry to moist, brown, some gravel	
3–4 ft / 1–1.5 m	12-11-10-10	BH18-04-2	◆	<5/<5	64		trace gravel, asphalt at 1.34 mbgs	92.00
4–6 ft / 1.5–2 m	6-6-7-8	BH18-04-3		<5/<5	89		some gravel, asphalt at 2.0 mbgs	91.00
8–9 ft / 2.5–3 m	8-6-8-10	BH18-04-4		<5/<5	36			
9–10 ft / 3–3.5 m	1-3-3-3	BH18-04-5		<5/<5	16		asphalt from 2.3 mbgs to 2.9 mbgs	90.00
12–14 ft / 4–4.5 m	1-3-2-3	BH18-04-6	◆	<5/<5	72		sandy SILT FILL moist to wet, dark, trace clay oxidation from 4.1 mbgs to 4.2 mbgs, black staining from 4.1 mbgs to 4.4 mbgs	89.00
16–17 ft / 5–5.5 m	1-1-2-3	BH18-04-7	◆	<5/<5	48			88.00
18–19 ft / 5.5–6 m	4-5-8-9	BH18-04-8A BH18-04-8B		<5/<5	34		SAND and SILT FILL wet, brown	
19–20 ft / 6–6.5 m							End of borehole at 5.9 mbgs	87.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

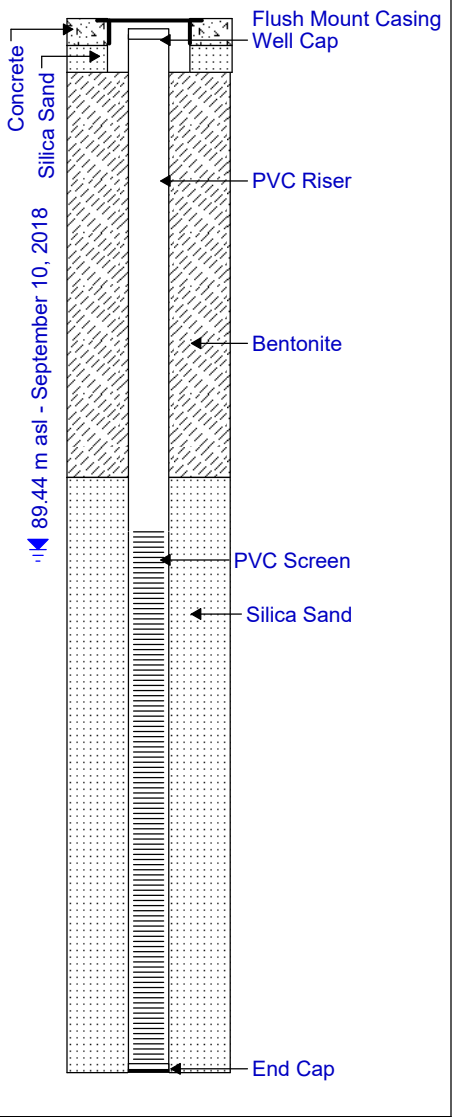
Borehole/Monitoring Well ID: BH18-05 (MW18-05)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 30, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR/ JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	92.43
0							SAND FILL dry to moist, dark brown, trace gravel asphalt from 0.45 mbgs to 0.50 mbgs	
1	4-4-7-6	BH18-05-1		5/<5	84			92.00
2								
3	2-12-15-10	BH18-05-2		<5/<5	50			
4								
5								91.00
6	10-5-4-7	BH18-05-3		<5/<5	56		dry to moist, brown, trace gravel asphalt from 1.58 mbgs to 2.1 mbgs	
7								
8							dry to moist, brown, trace silt	90.00
9	5-6-6-4	BH18-05-4		<5/<5	64			
10								
11	1-1-1-1	BH18-05-5	◆	<5/<5	56		moist to wet, brown, some silt	89.00
12								
13								
14	5-5-12-24	BH18-05-6	◆	<5/<5	43			88.00
15								
16	5-10-12-24	BH18-05-7	◆	<5/<5	97		wet, dark brown	
17								
18	6-8-11-10	BH18-05-8	◆	<5/<5	100		moist, dark brown, some silt	87.00
19								
20							End of borehole at 5.9 mbgs	



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole ID: BH18-06

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 30, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	92.40
							TOPSOIL	
1	1-3-5-18	BH18-06-1	◆	<5/<5	72		SAND (FILL) moist, dark brown, asphalt from 0.4 mbgs to 0.6 mbgs	92.00
2								
3 / 1	5-6-6-5	BH18-06-2	◆	<5/<5	72		dry to moist, dark brown, asphalt from 1.2 mbgs to 1.4 mbgs	
4								91.00
5								
6 / 2	3-3-2-3	BH18-06-3		55/120	56		moist, some gravel, granular asphalt and staining from 1.5 mbgs to 2.1 mbgs	
7								
8								90.00
9	1-3-3-4	BH18-06-4		96/175	39			
10 / 3								
11	1-3-5-2	BH18-06-5	◆	80/155	100		moist, dark brown, trace gravel staining from 2.3 mbgs to 3.7 mbgs	89.00
12								
13 / 4								
14	1-3-4-7	BH18-06-6	◆	90/170	72			
15							wet, dark brown/ black, water seepage with sheen from 4.2 mbgs to 4.4 mbgs	88.00
16	1-2-4-1	BH18-06-7		25/70	80			
17 / 5							wet, dark brown/ black, trace silt, water seepage with sheen	
18	1-5-20-12	BH18-06-8A		75/103	100			87.00
19		BH18-06-8B	◆	<5/3				
20 / 6							End of borehole at 5.9 mbgs	

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

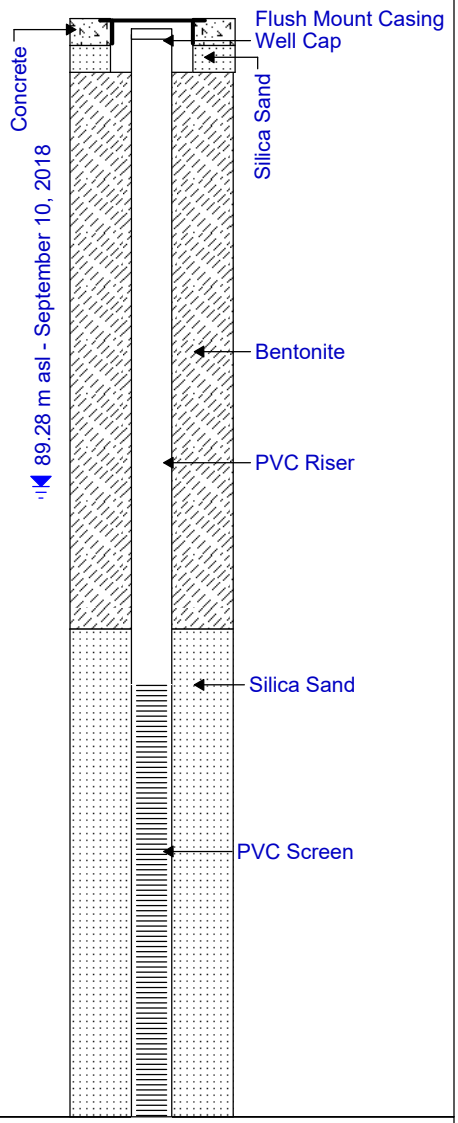
Borehole/Monitoring Well ID: BH18-07 (MW18-07)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 31, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	91.85
							TOPSOIL dry to moist, dark brown	
1	6-6-4-3	BH18-07-1		<5/<5	72		SAND FILL dry to moist, dark brown, trace silt	
2								
3 / 1	2-4-4-3	BH18-07-2A	◆	<5/<5	87		SAND and SILT FILL dry to moist, dark brown / red, trace silt, black staining from 1.1 mbgs to 1.2 mbgs	91.00
4		BH18-07-2B	◆	<5/<5				
5							SAND and GRAVEL FILL dry to moist, dark grey, some staining	
6 / 2	0-1-1-0	BH18-07-3		<5/<5	67		SAND and SILT FILL dry to moist, dark brown / red, black staining from 1.9 mbgs to 2.1 mbgs	90.00
7								
8								
9	1-1-2-1	BH18-07-4		<5/<5	72			
10 / 3							trace black staining from 3.6 mbgs to 3.7 m bgs	89.00
11								
12	1-1-0-1	BH18-07-5		<5/<5	46			
13 / 4							wet, dark brown / red, black staining from 3.8 m bgs to 4.4 m bgs, black staining from 4.3 m bgs to 4.4 m bgs	88.00
14	0-0-1-0	BH18-07-6	◆	</8	46			
15							SAND and ORGANICS FILL dry to moist, dark brown, oxidation from 4.6 m bgs to 2.1 m bgs	
16								87.00
17 / 5	1-1-2-2	BH18-07-7		5/4	6			
18							SAND FILL wet, dark brown / red, grey staining from 5.6 m bgs to 5.7 m bgs	
19	1-1-1-1	BH18-07-8		<5/<5	59			86.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

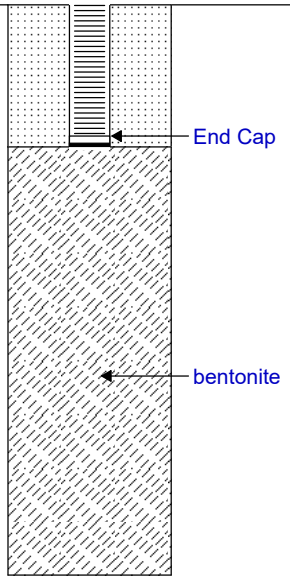
Borehole/Monitoring Well ID: BH18-07 (MW18-07)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 31, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20							silty SAND wet, dark brown / red, staining from 6.1 m bgs to 6.2 m bgs and from 6.5 m bgs to 6.7 m bgs	
21	2-2-1-2	BH18-07-9	◆	<5/<5	100			
22							black staining from 7.1 m bgs to 7.3 m bgs	85.00
23	1-2-4-3	BH18-07-10		<5/<5	72			
24							wet, dark brown / grey, dark grey staining from 7.6 m bgs to 8.2 m bgs	
25								84.00
26	14-16-20-32	BH18-07-11		<5/<5	56			
27							clayey SAND and SILT wet, dark brown / red, black staining from 8.7 m bgs to 8.8 m bgs	
28	16-20-30-35	BH18-07-12	◆	<5/<5	89			
29							End of Borehole at 9.0 m bgs.	83.00
30								
31								
32								82.00
33								
34								
35								
36								81.00
37								
38								
39								80.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

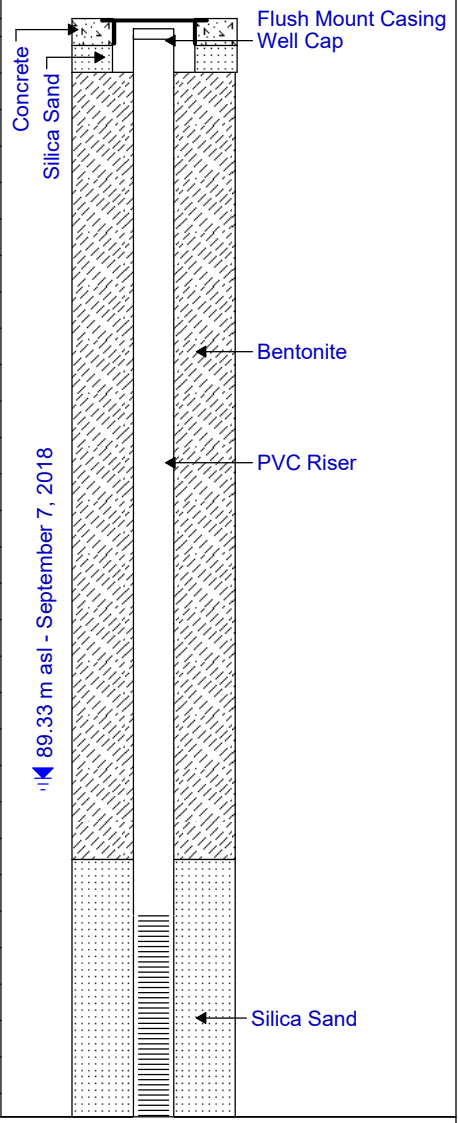
Borehole/Monitoring Well ID: BH18-08 (MW18-08)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 31, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	93.50
0–1 / 0	5-6-15-25	BH18-08-1		<5/<5	100		TOPSOIL some rocks SAND and GRAVEL FILL dry, brown / red, some silt	93.00
2–4 / 1	10-17-27-32	BH18-08-2	◆	<5/<5	100		SAND and SILT FILL dry, light brown / red, trace gravel, some rocks, black staining from 0.86 m bgs to 0.96 m bgs and from 1.2 m bgs to 1.4 m bgs	
5–6 / 2	4-8-9-12	BH18-08-3		<5/<5	77		orange oxidation at 1.8 m bgs, black sheen from 1.8 m bgs to 2.1 m bgs	92.00
7–9 / 2–3	3-2-2-3	BH18-08-4		<5/<5	80		dry to moist, light brown / red, trace clay, black staining and orange oxidation from 2.4 m bgs to 2.6 m bgs	
10–11 / 3	3-4-6-8	BH18-08-5		<5/<5	72		dark red / brown, some black staining from 3.0 m bgs to 3.7 m bgs	91.00
12–13 / 4							dry, dark brown / red, trace clay	
14 / 4	1-1-2-1	BH18-08-6		<5/<5	34			90.00
15–16 / 5	1-2-2-1	BH18-08-7	◆	<5/<5	74		SAND FILL moist to wet, dark brown / red, some silt and clay, trace white and black ribbons from 5.1 m bgs to 5.2 m bgs	89.00
17–18 / 5							SAND and SILT and GRAVEL FILL wet, dark grey	88.00
19	17-12-24-30	BH18-08-8	◆	<5/<5	41			



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

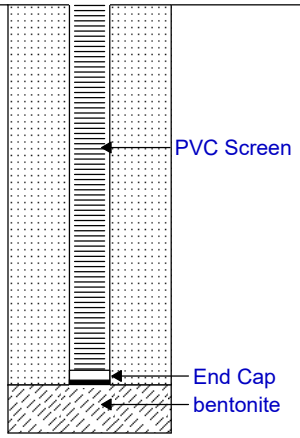
Borehole/Monitoring Well ID: BH18-08 (MW18-08)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: August 31, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
6							gravelly, silty SAND FILL wet, dark grey, black staining from 6.4 m bgs to 6.7 m bgs	87.00
7	1-1-3-1	BH18-08-9		<5/<5	59		SILT and SAND wet, dark brown / grey	
8	4-8-12-10	BH18-08-10	◆	<5/<5	48		silty SAND wet, dark red / grey, some large rocks and oxidation from 8.0 m bgs to 8.2 m bgs	86.00
9	6-10-12-13	BH18-08-11	◆	5/<5	64		End of Borehole at 8.2 m bgs	85.00
10								84.00
11								83.00
								82.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

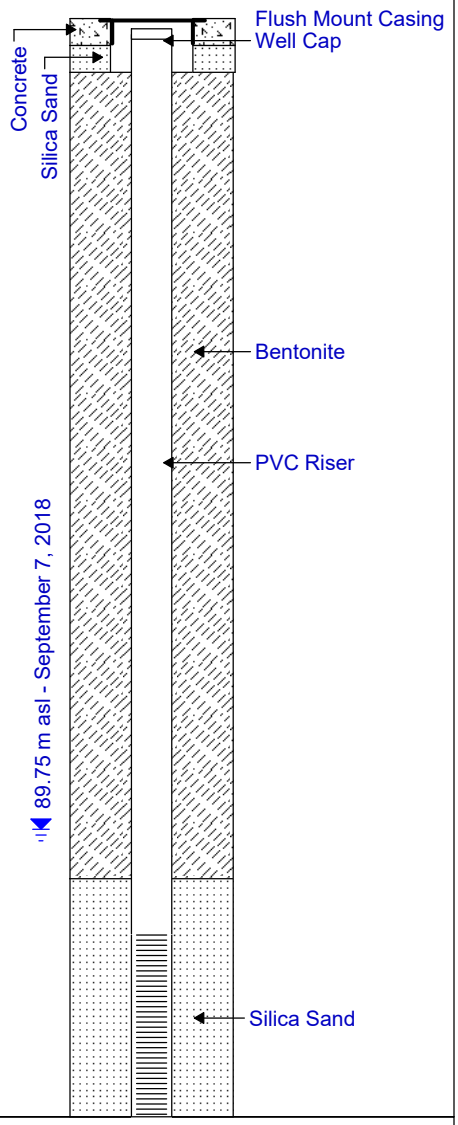
Borehole/Monitoring Well ID: BH18-09 (MW18-09)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	94.20
							TOPSOIL	
0–1	4-7-12-18	BH18-09-1	◆	<5/<5	92		SAND FILL dry, dark brown / red	
1–2								
2–3 / 1	5-11-17-20	BH18-09-2	◆	<5/<5	100			93.00
3–4								
4–5							dry, dark brown, black sheen throughout sample interval (1.5 m bgs to 2.1 m bgs)	
5–6								
6–7 / 2	5-6-6-13	BH18-09-3		<5/<5	31			
7–8								92.00
8–9							SILT and SAND FILL dry to moist, dark brown / red	
9–10	3-3-2-4	BH18-09-4		<5/<5	6			
10–11 / 3								
11–12	0-1-3-1	BH18-09-5		<5/<5	56			91.00
12–13							moist, trace clay	
13–14 / 4	1-1-1-1	BH18-09-6	◆	<5/<5	80			90.00
14–15								
15–16							moist to wet	
16–17 / 5	0-1-0-0	BH18-09-7		<5/<5	75			89.00
17–18							wet, black staining from 5.7 m bgs to 5.8 m bgs	
18–19								
19	0-0-0-0	BH18-09-8		<5/<5	39			



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

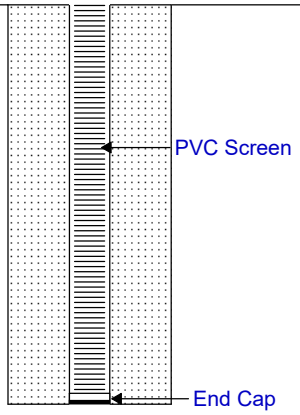
Borehole/Monitoring Well ID: BH18-09 (MW18-09)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20–21	2-2-3-3	BH18-09-9		<5/<5	98			88.00
23–24	0-3-2-2	BH18-09-10		<5/<5	62			87.00
26–27	0-2-3-3	BH18-09-11	◆	<5/<5	72		End of Borehole at 8.2 m bgs	86.00
								85.00
								84.00
								83.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole ID: BH18-10

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	93.30
							TOPSOIL	
1							SAND and GRAVEL FILL dry to moist, light brown,	93.00
2	8-24-50 fo 3"	BH18-10-1	◆	<5/<5	30			
3 / 1	8-13-11-22	BH18-10-2	◆	<5/<5	84		TOPSOIL organics, some rock	
4							SAND and GRAVEL FILL dry to moist	92.00
5	6-7-7-7	BH18-10-3	◆	<5/<5	87		CLAY FILL dry to moist, red brick at 1.4 m bgs	
6 / 2							silty SAND FILL moist, dark brown / red, some clay, staining from 1.6 m bgs to 1.8 m bgs,black sheen deposits at 1.8 m bgs	91.00
7	4-6-7-8	BH18-10-4		<5/<5	87			
8							SAND FILL moist, brown / red	
9 / 3	12-13-13-16	BH18-10-5A		<5/<5	39		brown	90.00
10		BH18-10-5B		<5/<5			CLAY and SILT moist to wet, brown / red,	
11								
12 / 4	7-13-13-14	BH18-10-6		<5/<5	87			89.00
13								
14	6-5-7-8	BH18-10-7		<5/<5	70		SAND wet, brown	
15 / 5							clayey SILT white / grey, some sand and gravel	88.00
16	2-4-3-4	BH18-10-8		<5/<5	100		SAND wet, dark brown, trace silt	
17								
18								
19								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

Borehole ID: BH18-10

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20								87.00
21	6-10-5-10	BH18-10-9	◆	<5/<5	100		grey	
22								
23	3-4-8-9	BH18-10-10		<5/<5	100			86.00
24								
25	5-8-17-22	BH18-10-11	◆	<5/<5	100		some silt and clay	
26								85.00
27							End of Borehole at 8.2 m bgs	
28								
29								84.00
30								
31								
32								83.00
33								
34								
35								82.00
36								
37								
38								
39								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

Borehole ID: BH18-11

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	95.80
1							SAND and GRAVEL FILL dry to moist, brown	
2	11-21-15-18	BH18-11-1	◆	<5/<5	72			
3 / 1							GRAVEL FILL dry to moist, some sand, organics, and brick	95.00
4	9-8-6-4	BH18-11-2		<5/<5	38			
5							red / grey	
6								94.00
7 / 2	5-15-21-5	BH18-11-3		<5/<5	36			
8							No sample	
9	4-5-5-6	BH18-11-4		NA	0			93.00
10 / 3							End of Borehole at 3.0 m bgs	
11								
12								92.00
13 / 4								
14								
15								91.00
16 / 5								
17								
18								90.00
19								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

Borehole ID: BH18-12

Project No.: 655184
Supervisor: CR
Drilling Company: Landshark Drilling Inc.
Client: City of Hamilton
Drilling Method: Hollow Stem Auger
Drilling Equipment: B57
Location: Central Park, Hamilton, ON
Borehole Diameter: 20.3 cm
OVM/PID: RKI Eagle 2
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	95.90
							SAND and SILT FILL dry to moist, trace clay	
1	11-21-15-18	BH18-12-1	◆	<5/<5	89		TOPSOIL dark brown	
2							SAND and SILT FILL dry to moist,red / brown trace clay	
3 / 1	9-8-6-4	BH18-12-2		<5/<5	85		silty SAND FILL dry to moist, brown / red, some topsoil and organics	95.00
4								
5							SAND FILL dry to moist, brown / red	
6 / 2	5-15-21-5	BH18-12-3	◆	<5/<5	85			94.00
7							End of Borehole at 2.1 m bgs	
8								
9								
10 / 3								93.00
11								
12								
13 / 4								92.00
14								
15								
16 / 5								91.00
17								
18								
19								90.00

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

Borehole ID: BH18-13

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	95.60
							SAND and SILT FILL dry to moist, trace clay	
1	8-11-9-11	BH18-13-1	◆	<5/<5	80		TOPSOIL dark brown	95.00
2							SAND and SILT FILL dry to moist,red / brown trace clay	
3 / 1	27-50 for 5"	BH18-13-2		NA	0		silty SAND FILL dry to moist, brown / red, some	
4							topsoil and organics	
5							SAND FILL dry to moist, brown / red	94.00
6 / 2								
7	8-50 fo 4"	BH18-13-3		<5/<5	16			
8								
9	7-4-3-2	BH18-13-4	◆	<5/<5	72			93.00
10 / 3							End of Borehole at 3.0 m bgs	
11								
12								92.00
13 / 4								
14								
15								91.00
16								
17 / 5								
18								90.00
19								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

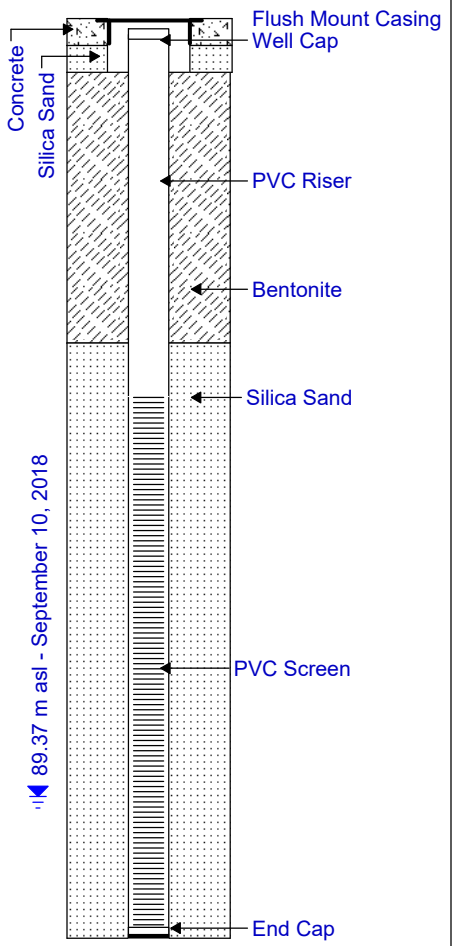
Borehole/Monitoring Well ID: BH18-14 (MW18-14)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	93.75
0 / 0							large rock	
1	NA	BH18-14-1		0	0		No recovery	
2							SAND (FILL) dry to moist, dark brown / red	93.00
3 / 1								
4	2-3-3-3	BH18-14-2	◆	<5/2	23			
5							red / grey, some gravel	
6	3-4-3-50 for 2"	BH18-14-3	◆	<5/1	64			92.00
7 / 2								
8	12-16-17-21	BH18-14-4	◆	<5/1	100		dark brown / red / grey, some gravel	
9								91.00
10 / 3								
11	3-11-13-13	BH18-14-5		<5/<5	100		moist, dark brown / red, trace gravel	
12								
13 / 4	7-21-17-12	BH18-14-6		<5/<5	100		some gravel and silt, red / black stone from 4.0 m bgs to 4.1 m bgs	90.00
14								
15							sandy SILT moist to wet, brown, trace clay	
16 / 5	7-6-5-6	BH18-14-7	◆	<5/<5	63			89.00
17								
18							End of Borehole at 5.2 m bgs	
19								88.00
20 / 6								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole ID: BH18-15

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	94.10
1	15-8-8-6	BH18-15-1		<5/<5	75		SAND FILL dry to moist, dark brown / red, trace silt	
2								
3 / 1	5-5-5-8	BH18-15-2	◆	<5/32	80		dark brown, silty sand bands from 1.1 m bgs to 1.2 m bgs	93.00
4								
5	4-8-8-8	BH18-15-3		<5/<5	98		brown / red, trace silt	
6 / 2								
7								92.00
8	6-15-24-28	BH18-15-4	◆	<5/136	82		moist, grey red / brown grey	
9								
10 / 3							End of Borehole at 2.9 m bgs	91.00
11								
12								
13 / 4								90.00
14								
15								
16								
17 / 5								89.00
18								
19								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

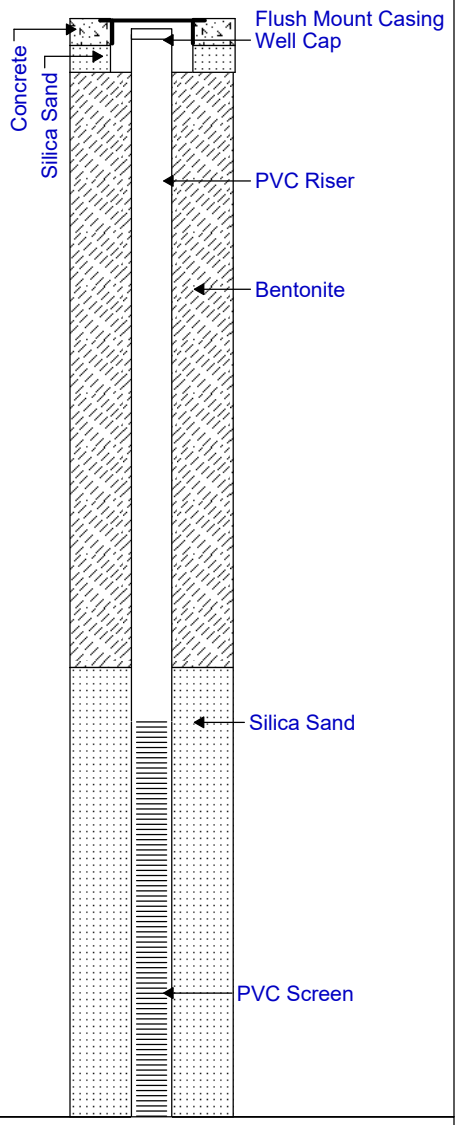
Borehole/Monitoring Well ID: BH18-16 (MW18-16)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	94.31
							TOPSOIL dry, dark brown, trace silt, some black staining (sheen) from 0.4 m bgs to 0.5 m bgs	
							dry to moist, dark brown, black staining (sheen) from 1.2 m bgs to 1.4 m bgs	94.00
	5-9-9-7	BH18-16-1		<5/<5	39			
	4-3-2-2	BH18-16-2		<5/<5	64			
								93.00
							silty SAND FILL dry to moist, dark brown / red	
	2-1-2-2	BH18-16-3	◆	<5/<5	61			
								92.00
							SAND FILL moist, dark brown, trace silt, black staining (sheen) at 2.6 m bgs and from 2.8 m bgs to 2.9 m bgs	
	2-2-1-2	BH18-16-4		<5/<5	57			
							SAND and SILT FILL moist to wet, dark brown / red, black staining (sheen) from 3.0 m bgs to 4.4 m bgs	
	1-2-3-4	BH18-16-5	◆	<5/<5	39		some wood pieces	91.00
	1-1-2-3	BH18-16-6	◆	<5/<5	56			
								90.00
							wet, dark red / brown, trace clay, grey / black staining (sheen)	
	1-2-2-3	BH18-16-7		<5/<5	44			
								89.00
							dark grey, black staining (sheen) from 5.3 m bgs to 5.9 m bgs	
	3-1-0-1	BH18-16-8	◆	<5/<5	44			



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-16 (MW18-16)

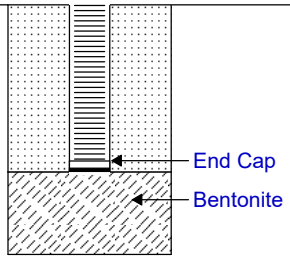
Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21							dark brown / grey, some black staining from 6.1 m bgs to 6.7 m bgs, wood pieces from 6.5 m bgs to 6.7 m bgs	88.00
22	1-2-4-5	BH18-16-9		<5/<5	39			
23							dark grey, black staining (sheen) from 7.3 m bgs to 7.5 m bgs	87.00
24	1-1-1-1	BH18-16-10	◆	<5/<5	48			
25							End of Borehole at 7.5 m bgs	
26								86.00
27								
28								
29								85.00
30								
31								
32								84.00
33								
34								
35								83.00
36								
37								
38								
39								
40								

7 8 9 10 11 12



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

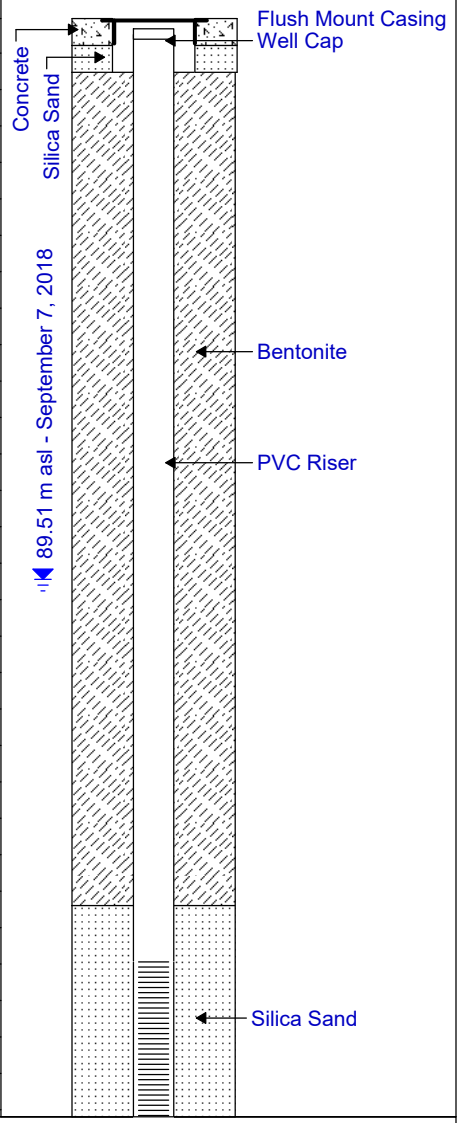
Borehole/Monitoring Well ID: BH18-17 (MW18-17)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	92.59
0–1 / 0–0.3	2-4-4-4	BH18-17-1		<5/<5	100		TOPSOIL and SAND FILL dry, dark brown, black staining (sheen) from 0.5 m bgs to 0.6 m bgs dry to moist, dark brown, black staining (sheen) from 1.2 m bgs to 1.4 m bgs	
1–2 / 0.3–0.6								92.00
2–3 / 0.6–0.9	2-3-4-2	BH18-17-2	◆	<5/<5	100			
3–4 / 0.9–1.2								
4–5 / 1.2–1.5							SAND and SILT FILL moist, dark brown, black staining (sheen) from 2.0 m bgs to 2.1 m bgs wet, dark brown / white, some gravel	91.00
5–6 / 1.5–1.8	1-2-2-2	BH18-17-3		<5/6	77			
6–7 / 1.8–2.1								
7–8 / 2.1–2.4	1-1-0-1	BH18-17-4		<5/<5	100			90.00
8–9 / 2.4–2.7							black staining (sheen) from 3.5 m bgs to 3.6 m bgs	
9–10 / 2.7–3.0	0-0-0-1	BH18-17-5		<5/<5	60			89.00
10–11 / 3.0–3.4							black stainging (sheen) throughout sample interval	
11–12 / 3.4–3.7	0-1-1-1	BH18-17-6	◆	<5/<5	23			
12–13 / 3.7–4.0							dark brown / red	88.00
13–14 / 4.0–4.3	1-1-1-2	BH18-17-7		<5/<5	23			
14–15 / 4.3–4.6							silty SAND FILL wet, dark brown, some cobbles	87.00
15–16 / 4.6–4.9	2-2-1-1	BH18-17-8		<5/<5	56			



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

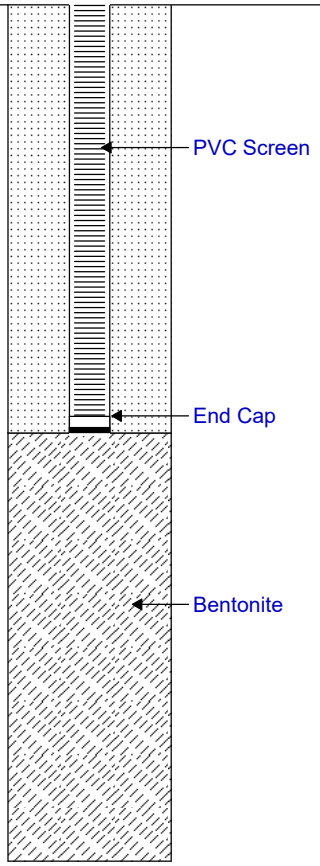
Borehole/Monitoring Well ID: BH18-17 (MW18-17)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 4, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20							SAND and SILT FILL wet, dark grey, black staining (sheen) streaks in sample interval	
21								
22	1-2-3-5	BH18-17-9	◆	<5/<5	28			86.00
23							dark brown / red, grey / black staining (sheen) from 7.2 m bgs to 7.3 m bgs	
24	1-4-6-5	BH18-17-10		<5/<5	23			
25							SAND FILL wet, dark brown / red	85.00
26	4-6-9-8	BH18-17-11	◆	5/<5	39		CLAY FILL	
27							SAND and SILT FILL	
28							SAND FILL wet, dark brown / red	84.00
29	4-18-21-18	BH18-17-12		5/<5	66		brown / grey	
30							CLAY FILL	
31	3-6-5-7	BH18-17-13	◆	5/<5	67			83.00
32								
33							wet, dark red / brown / grey, some sand, trace silt	
34	5-5-5-15	BH18-17-14	◆	5/<5	75			
35							End of Borehole at 10.5 m bgs.	82.00
36								
37								
38								81.00
39								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole ID: BH18-18

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 5, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	87.90
0 – 1 / 0	3-16-12-14	BH18-18-1	◆	<5/<5	100		gravelly SAND FILL dry to moist, dark brown / grey, black staining (sheen) from 0.4 m bgs to 0.6 m bgs	
2 – 3 / 1	6-5-8-7	BH18-18-2		<5/<5	89		black staining (sheen) from 0.8 m bgs to 1.4 m bgs	87.00
4 – 6 / 2	3-4-4-5	BH18-18-3		<5/<5	56		SAND FILL dry to moist, dark brown / red, some gravel, tar pieces, red / brown staining from 1.9 m bgs to 2.1 m bgs	86.00
7 – 9 / 2	0-1-1-1	BH18-18-4		<5/<5	34		moist, dark grey, some gravel, trace silt, some staining (sheen)	
10 – 11 / 3	2-1-1-1	BH18-18-5	◆	<5/<5	75		gravelly SAND FILL moist to wet, dark grey wet, white napthaline staining from 3.5 m bgs to 3.7 m bgs	85.00
12 – 14 / 4	0-0-1-1	BH18-18-6		<5/<5	100		SILT and SAND FILL moist to wet, dark grey, black staining (sheen) from 3.8 m bgs to 4.4 m bgs	84.00
15 – 17 / 5	1-1-1-1	BH18-18-7		<5/<5	97		SAND FILL moist to wet, dark grey, some silt, trace gravel, black staining (sheen) from 4.9 m bgs to 5.2 m bgs	83.00
18 – 19	2-1-8-0	BH18-18-8		<5/<5	100		SAND and SILT FILL wet, brown, trace gravel and clay	82.00

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

SNC·LAVALIN

Borehole ID: BH18-18

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 5, 2018
Supervisor: CR / JP
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
OVM/PID: RKI Eagle 2
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCAITON	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20								
21	0-0-2-5	BH18-18-9		<5/<5	100		silty SAND FILL wet, brown, trace clay	
22								
23	1-1-2-4	BH18-18-10		<5/<5	100		SAND and SILT FILL wet, brown / grey, trace gravel and clay, some black staining (sheen) at 7.5 m bgs	81.00
24								
25								
26	0-2-2-2	BH18-18-11		<5/<5	100		silty SAND FILL moist to wet, dark brown / grey, trace gravel and clay, some black staining (sheen) from 7.6 m bgs to 8.7 m bgs	80.00
27								
28	2-2-6-7	BH18-18-12A	◆	<5/<5	100			
29	2-2-6-9	BH18-18-12B		<5/<5	39		SILT AND CLAY light brown, trace sand	79.00
30							End of Borehole at 9 m bgs	
31								
32								78.00
33								
34								
35								77.00
36								
37								
38								
39								76.00

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

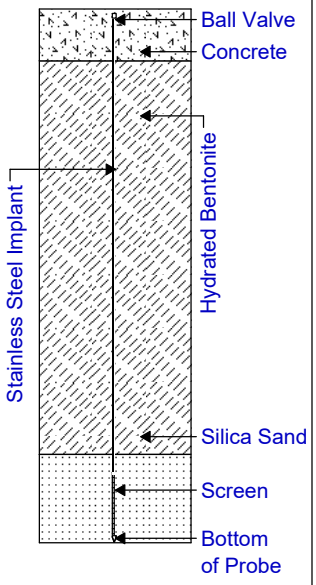
Borehole/Soil Vapour Probe ID: BH18-19 (SVP18-01)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 5, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Vapour Probe Diameter: 0.64 cm
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Probe Screen Slot Size: 0.145 mm

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	86.78
							ASPHALT	
							GRAVEL and SAND FILL dry, brown / grey, some brown sand	
1	7-12-19-17	BH18-19-1		<5/<5	67			
							brown, black staining (sheen) from 1.1 m bgs to 1.2 m bgs, staining at 1.3 m bgs	
2								86.00
3 / 1								
4	14-14-17-15	BH18-19-2	◆	<5/<5	58			
5							End of Borehole at 1.5 m bgs.	
6								85.00
7 / 2								
8								
9								84.00
10 / 3								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) reading (ppmv unless noted)

The data represented in this borehole log requires interpretation by SNC-Lavalin personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

NA = Not applicable

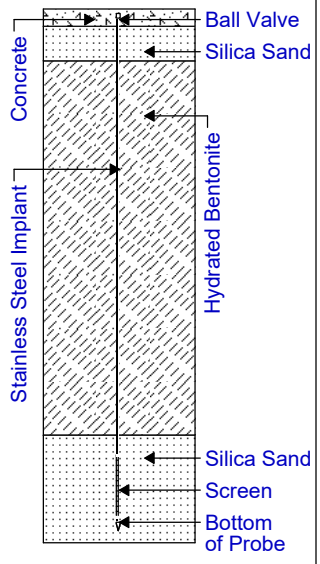
Borehole/Soil Vapour Probe ID: BH18-20 (SVP18-02)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 5, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Vapour Probe Diameter: 0.64 cm
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Probe Screen Slot Size: 0.145 mm

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	93.29
							TOPSOIL	
1	7-20-28-26	BH18-20-1		<5/<5	72		GRAVEL and SAND FILL dry, brown	93.00
2								
3 / 1								
4	6-50 for 3"	BH18-20-2	◆	<5/<5	30		some brick and debris	92.00
5							SAND dry to moist, dark brown, some gravel	
6	8-4-3-2	BH18-20-3		<5/<5	43			
7 / 2							End of Borehole at 2.1 m bgs	91.00
8								
9								
10 / 3								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) reading (ppmv unless noted)

The data represented in this borehole log requires interpretation by SNC-Lavalin personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

NA = Not applicable

SNC·LAVALIN

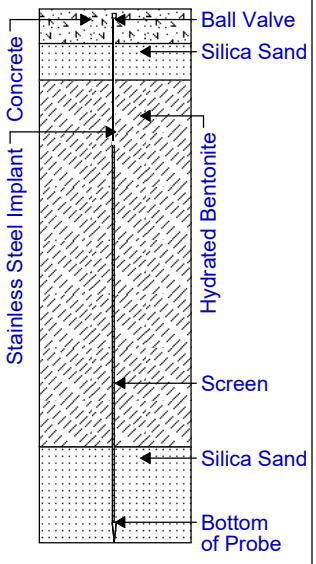
Borehole/Soil Vapour Probe ID: BH18-21 (SVP18-03)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 6, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Vapour Probe Diameter: 0.64 cm
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Probe Screen Slot Size: 0.145 mm

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
0 / 0							Ground Surface	93.17
							TOPSOIL	
							GRAVEL and SAND FILL dry to moist, brown	93.00
1	2-5-3-4-4	BH18-21-1		<5/<5	56			
2							SILT FILL	
3 / 1	4-5-6-8-10	BH18-21-2		<5/1	100		SAND FILL brown / grey, some silt, trace gravel black granular pieces from 1.0 m bgs to 1.1 m bgs	92.00
5							End of Borehole at 1.5 m bgs.	
6 / 2								
7								91.00
8								
9								
10 / 3								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) reading (ppmv unless noted)

The data represented in this borehole log requires interpretation by SNC-Lavalin personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

NA = Not applicable

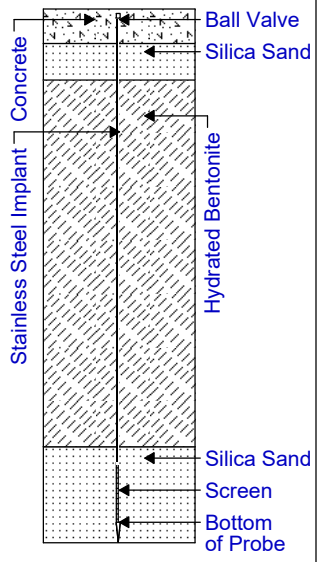
Borehole/Soil Vapour Probe ID: BH18-22 (SVP18-04)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 6, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Vapour Probe Diameter: 0.64 cm
Borehole Diameter: 20.3 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Probe Screen Slot Size: 0.145 mm

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	90.82
0 – 1	2-3-6-9-15	BH18-21-1		<5/<5	83		TOPSOIL	
1 – 2							GRAVEL and SAND FILL dry to moist, brown	
2 – 3	12-14-18-5-4	BH18-21-2		<5/<5	68		moist, black staining (sheen) at 1.1 m bgs	90.00
3 – 4							SAND FILL red / brown black staining (sheen)	
4 – 5								
5 – 6							End of Borehole at 1.5 m bgs.	89.00
6 – 7								
7 – 8								
8 – 9								88.00
9 – 10								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) reading (ppmv unless noted)

The data represented in this borehole log requires interpretation by SNC-Lavalin personnel. Third parties using this log do so at their own risk.

All elevations and locations are approximate.

◆ = Sample submitted for laboratory analysis.

NA = Not applicable

SNC·LAVALIN

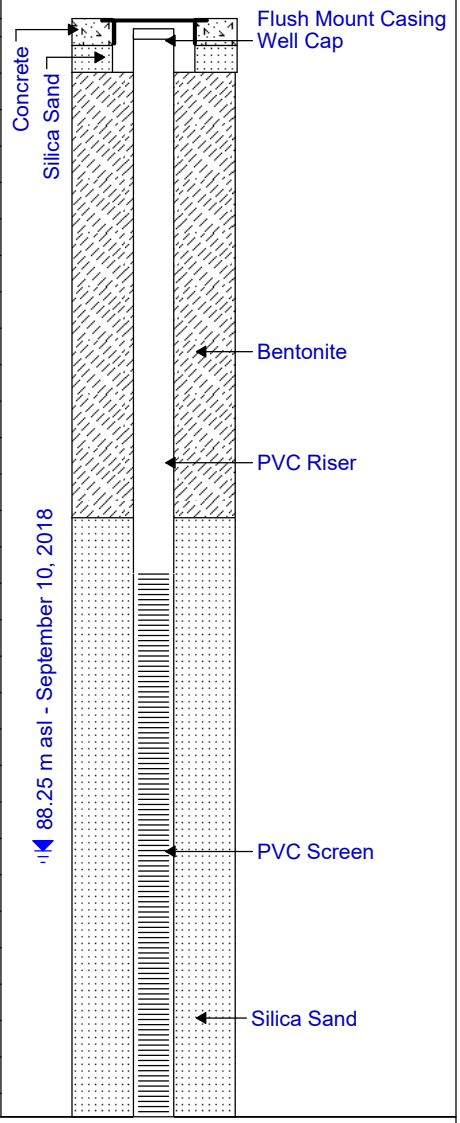
Borehole/Monitoring Well ID: BH18-23 (MW18-23)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 6, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	90.70
0 – 1 / 0	NA	BH18-23-1		NA	0		SAND FILL dry to moist, brown / red, some gravel	
3 – 4 / 1	7-6-3-7	BH18-23-2	◆	<5/<5	72		SAND and GRAVEL FILL dry to moist, brown, trace silt	90.00
5 – 6 / 2	5-4-5-4	BH18-23-3		<5/<5	74		SAND FILL dry to moist, brown / red, trace silt	89.00
7 – 9 / 2	2-3-3-2	BH18-23-4		<5/<5	72		brown, some gravel, trace silt	88.00
10 – 11 / 3	2-1-1-0	BH18-23-5	◆	<5/<5	100		moist to wet, brown / grey, some silt wet, oxidation staining	87.00
13 – 14 / 4	0-0-0-0	BH18-23-6		<5/<5	75		SILT and SAND FILL moist to wet, brown / red	86.00
16 – 17 / 5	0-0-0-1	BH18-23-7		<5/<5	36			
18 – 19	1-2-4-5	BH18-23-8	◆	<5/<5	92		SAND FILL wet, brown / grey, some silt red / brown	85.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

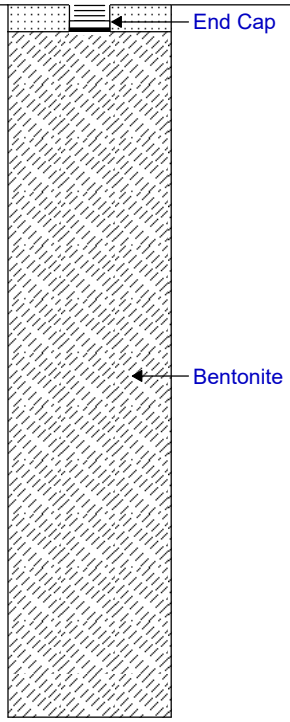
Borehole/Monitoring Well ID: BH18-23 (MW18-23)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 6, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: CR
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20							wet, grey	
21	1-2-5-7	BH18-23-9	◣	<5/<5	100		CLAY and SILT FILL wet, light brown	
22							silty SAND FILL wet, grey	84.00
23	12-20-18-12	BH18-23-10	◣	<5/<5	100		CLAY and SILT FILL wet, light brown	
24							SAND / CLAY / SILT FILL wet, grey, trace sand	
25							CLAY FILL wet, light grey, some silt, trace sand	83.00
26	1-2-5-7	BH18-23-11	◣	<5/<5	79			
27								
28	1-1-1-2	BH18-23-12	◣	<5/<5	100			82.00
29								
30								
31	1-2-3-5	BH18-23-13	◆	<5/<5	100			
32								81.00
33							End of Borehole at 9.8 m bgs.	
34								
35								80.00
36								
37								
38								
39								79.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

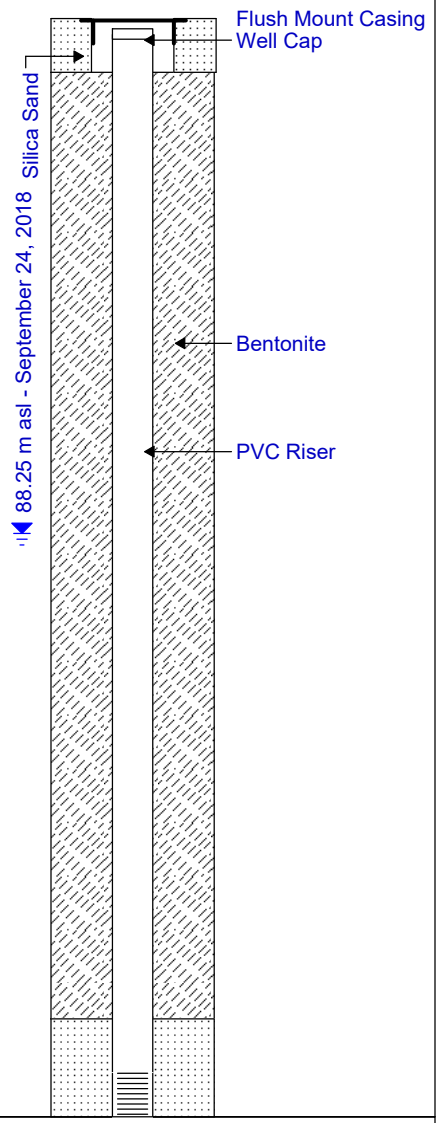
Borehole/Monitoring Well ID: BH18-24 (MW18-24)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 12, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	91.14
0	NA	BH18-24-1		NA	0		no sample	
2							SAND FILL dry, brown, trace clay, black staining (sheen) from 1.1 m bgs to 1.4 m bgs	
4	3-8-17-23	BH18-24-2		<5/<5	72			90.00
6	3-6-6-10	BH18-24-3		<5/<5	74		silty SAND dry to moist, dark brown, trace clay, red / grey from 1.8 m bgs to 2.0 m bgs, black staining (sheen) from 2.0 m bgs to 2.1 m bgs	
8							moist, dark brown	89.00
9	2-3-4-2	BH18-24-4		<5/<5	72			
10							SAND moist to wet, light brown / red, some silt, black staining (sheen) at 3.4 m bgs	88.00
12	1-0-1-0	BH18-24-5		<5/<5	100		moist to wet, dark brown / red, some silt, black staining (sheen) from 3.9 m bgs to 4.0 m bgs	
14	2-4-4-6	BH18-24-6	◆	<5/<5	75			87.00
16	3-9-11-9	BH18-24-7	◆	<5/<5	36		SILT and SAND wet, dark brown / red, trace clay	86.00
18	0-0-6-8	BH18-24-8		<5/<5	92		SAND wet, dark brown / red, trace silt and clay	
20								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

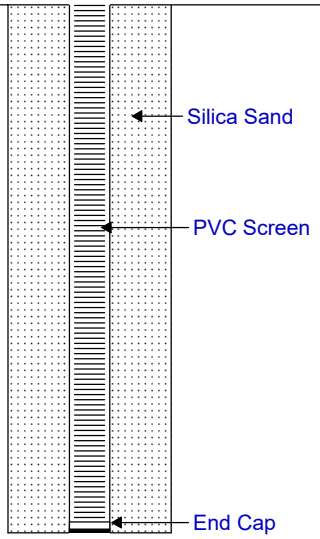
Borehole/Monitoring Well ID: BH18-24 (MW18-24)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 12, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21	12-21-23-17	BH18-24-9		<5/<5	100			
22								
23	12-15-15-8	BH18-24-10		<5/<5	100			84.00
24								
25							CLAY wet, dark red / grey, trace sand	
26	2-2-2-3	BH18-24-11		<5/<5	79			83.00
27								
28								
29	1-1-2-3	BH18-24-12	◆	<5/<5	100			
30							End of Borehole at 9.0 m bgs.	82.00
31								
32								
33								81.00
34								
35								
36								80.00
37								
38								
39								
40								79.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

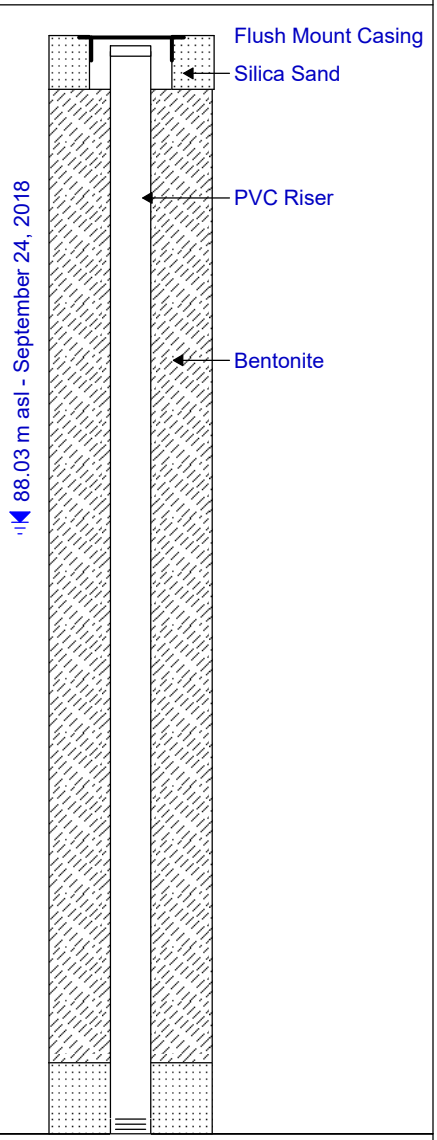
Borehole/Monitoring Well ID: BH18-25 (MW18-25)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	90.77
0							GRAVEL and SAND FILL dry to moist, dark brown, asphalt pieces from 0.4 m bgs to 0.5 m bgs	
2	12-4-3-3	BH18-25-1		<5/<5	39			
							ASPHALT	90.00
3 / 1	12-3-3-9	BH18-25-2	◆	<5/<5	80		GRAVEL FILL	
							SILT and SAND FILL dry to moist, dark red / grey, trace clay, wood pieces, some black staining (sheen)	89.00
6							dark grey, some glass and brick, black staining (sheen) from 1.5 m bgs to 2.1 m bgs	
7 / 2	3-3-3-3	BH18-25-3		<5/6	39			
9	2-1-1-4	BH18-25-4		<5/<5	56		sandy GRAVEL FILL dry to moist, dark grey / black, trace clay	88.00
10 / 3							GRAVEL FILL wet, black staining (sheen) from 3.0 m bgs to 3.7 m bgs	
12	1-2-3-2	BH18-25-5		<5/<5	36			87.00
13 / 4							silty SAND FILL wet, dark red, some red brick pieces with black staining (sheen)	
14	6-3-2-2	BH18-25-6		<5/<5	43			
15							black staining with sheen, wood pieces and small rocks	86.00
16 / 5	1-3-4-8	BH18-25-7		<5/<5	39			
18							black staining (sheen) from 5.3 m bgs to 5.9 m bgs	
19	2-1-1-1	BH18-25-8	◆	<5/6	33			85.00
20 / 6								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

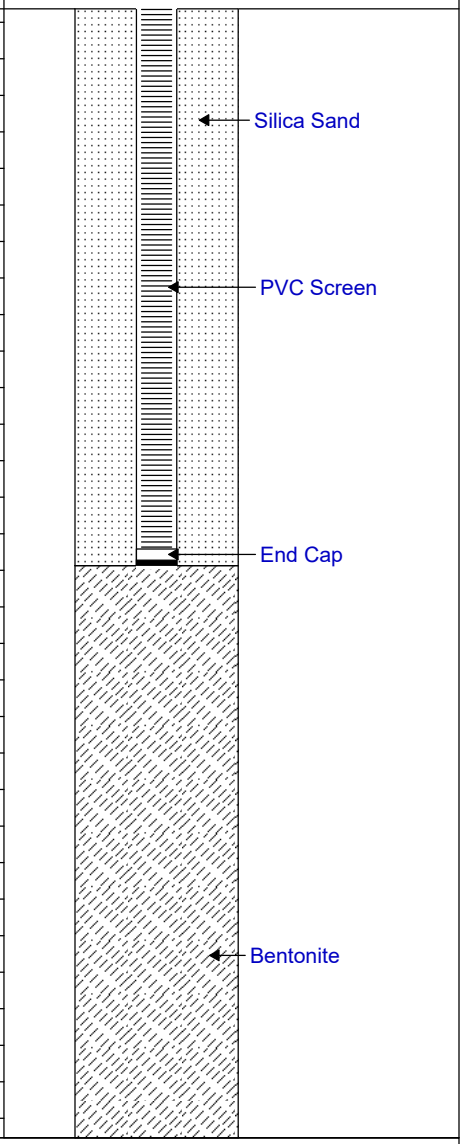
NA = Not Applicable

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21							blak, some small rocks	
22	1-0-1-0	BH18-25-9		<5/<5	15			84.00
23	7							
24								
25	2-2-1-2	BH18-25-10		<5/<5	7		some gravel	83.00
26	8							
27	1-1-1-1	BH18-25-11		<5/<5	33			
28								
29	0-1-1-3	BH18-25-12 ◆		<5/<5	44			82.00
30	9						sheen	
31								
32	3-4-4-5	BH18-25-13 ◆		<5/<5	38			81.00
33	10						silty CLAY wet, dark brown, black staining with sheen from 9.5 m bgs to 10.5 m bgs	
34	2-2-2-2	BH18-25-14		<5/<5	56			
35							dark grey, some black staining (sheen)	80.00
36	11							
37	2-1-0-1	BH18-25-15		<5/<5	50			
38							light grey, black water with sheen	
39	4-4-5-6	BH18-25-16		<5/<5	89			79.00
40	12							



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-25 (MW18-25)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
41	3-4-7-8	BH18-25-17	◆	<5/<5	89			78.00
42								
43								
44	8-6-5-5	BH18-25-18	◆	<5/<5	72			
45							End of Borehole at 13.6 m bgs.	77.00
46								
47								
48								76.00
49								
50								
51								
52								75.00
53								
54								
55								74.00
56								
57								
58								73.00
59								
60								

13 14 15 16 17 18

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

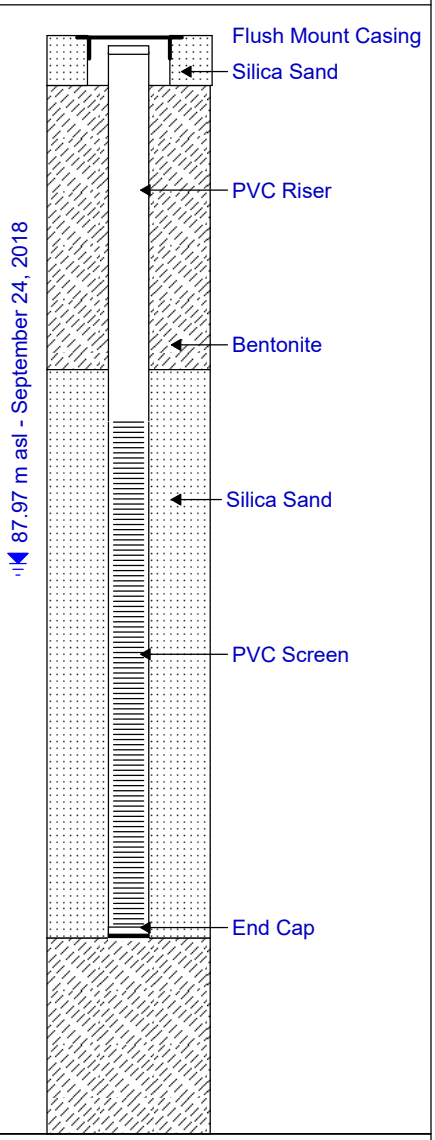
Borehole/Monitoring Well ID: BH18-26 (MW18-26)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	91.09
0–2 / 0–0.6							TOPSOIL dry to moist, dark brown	
2 / 0.6	1-2-1-2	BH18-26-1		<5/<5	23			
2–3 / 0.6–0.9							SAND FILL dry to moist, brown / red,	
3–4 / 0.9–1.2	4-5-11-13	BH18-26-2		<5/<5	80		TOPSOIL	90.00
4–6 / 1.2–1.8							SAND FILL some rocks and broken glass, black staining (sheen) from 1.2 m bgs to 1.4 m bgs	
6–7 / 1.8–2.1	4-4-3-4	BH18-26-3		<5/<5	56		SAND and TOPSOIL dry to moist, dark brown, black staining (sheen) from 1.5 m bgs to 2.1 m bgs	89.00
8–9 / 2.4–2.7	1-1-2-2	BH18-26-4	◆	<5/14	66		SAND and GRAVEL FILL moist, dark grey, trace silt, green seem from 2.6 m bgs to 2.7 m bgs, cobbles and rock / oxidation from 2.7 m bgs to 2.9 m bgs	
10–11 / 3.0–3.4								88.00
11–12 / 3.4–3.7	1-1-2-2	BH18-26-5		<5/<5	51		wet, dark brown / grey, trace silt, black staining (sheen) from 3.0 m bgs to 3.7 m bgs	
13–14 / 4.0–4.3	2-1-2-1	BH18-26-6		<5/<5	47		rocks and black staining (sheen) / sheen from 4.3 m bgs to 4.4 m bgs, some glass	87.00
15–16 / 4.6–4.9	2-1-2-1	BH18-26-7		<5/<5	56		some glass, black sheen and rocks from 4.6 m bgs to 5.2 m bgs	
17–18 / 5.2–5.5							black, some glass	86.00
19 / 5.8	2-1-1-1	BH18-26-8	◆	<5/6	36			
20–21 / 6.1–6.4							gravelly SAND FILL wet, black, sheen	85.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-26 (MW18-26)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
22	2-1-3-6	BH18-26-9		<5/<5	39			
23	7							
24	3-3-2-2	BH18-26-10		<5/<5	72			84.00
25								
26	8	0-1-3-3	BH18-26-11	<5/<5	89		CLAY wet, light brown / red / grey, some silt, black sheen	
27								83.00
28							light brown / grey / black, trace silt, some sheen	
29	4-6-6-9	BH18-26-12		<5/<5	64			
30	9						some rocks, black staining (sheen) from 9.1 m bgs to 9.8 m bgs	82.00
31								
32	1-1-1-1	BH18-26-13		<5/<5	43			
33	10						some sheen	81.00
34	3-5-6-8	BH18-26-14	◆	<5/<5	85			
35							minor black staining (sheen) with sheen	
36	11	2-3-7-10	BH18-26-15	<5/<5	80			80.00
37							light grey	
38								
39	2-4-8-10	BH18-26-16		<5/<5	72			
40	12						some black staining and sheen	79.00
41	2-2-3-3	BH18-26-17		<5/<5	100			
42								

Bentonite

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-26 (MW18-26)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
13								78.00
43	4-3-3-3	BH18-26-18	◆	<5/<5	89			
44								
45							End of Borehole at 13.6 m bgs	
14								77.00
46								
47								
48								
49								
15								76.00
50								
51								
52								
16								75.00
53								
54								
55								
17								74.00
56								
57								
58								
59								
18								73.00
60								
61								
62								
19								72.00
63								

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

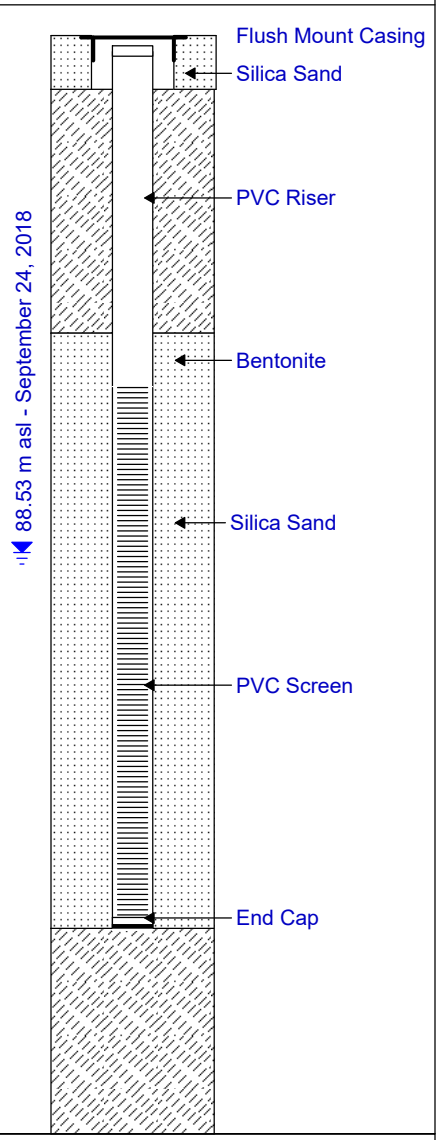
Borehole/Monitoring Well ID: BH18-27 (MW18-27)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	91.44
0–1	2-6-8-13	BH18-27-1		<5/<5	48		TOPSOIL dry, light brown, some sand and rocks	
2–3 / 1							some concrete pieces, black staining (sheen) at 1.4 m bgs	91.00
4	4-16-refusal	BH18-27-2		<5/16	31			
5–6							large white rocks from 2.0 m bgs to 2.1 m bgs, black staining (sheen) at 1.8 m bgs	90.00
7 / 2	11-12-8-6	BH18-27-3		10/<5	39			
8–9	4-4-3-5	BH18-27-4		55/152	43		SAND and SILT moist to wet, dark brown / red, black staining (sheen) with sheen at 2.9 m bgs	89.00
10 / 3							silty SAND wet, black staining (sheen) from 3.8 m bgs to 9.1 m bgs	
11–12	3-2-1-1	BH18-27-5		110/225	44			88.00
13 / 4								
14	3-1-1-1	BH18-27-6		5/34	64			87.00
15–16 / 5	1-1-2-1	BH18-27-7		5/21	82			
17–18								86.00
19 / 6	2-1-1-1	BH18-27-8		5/175	72			
20								



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

Borehole/Monitoring Well ID: BH18-27 (MW18-27)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
21								
22	3-1-2-1	BH18-27-9	◆	<5/6	46			
23	7							
24	3-2-2-1	BH18-27-10	◆	<5/33	52			
25								
26	8							
27	7-2-1-1	BH18-27-11	◆	<5/<5	23		some wood	
28								
29	4-refusal	BH18-27-12	◆	<5/<5	39			
30	9						clayey SAND wet, light grey, black staining (sheen) from 9.3 m bgs to 9.4 m bgs	
31								
32	6-4-7-10	BH18-27-13	◆	<5/<5	43			
33	10						dark red / grey, trace clay, black staining (sheen) from 10.2 m bgs to 10.3 m bgs and from 10.4 to 10.5 m bgs	
34	5-7-10-10	BH18-27-14	◆	<5/<5	56			
35							End of Borehole at 10.5 m bgs.	
36	11							
37								
38								
39	12							
40								

85.00
84.00
83.00
82.00
81.00
80.00

Bentonite

(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

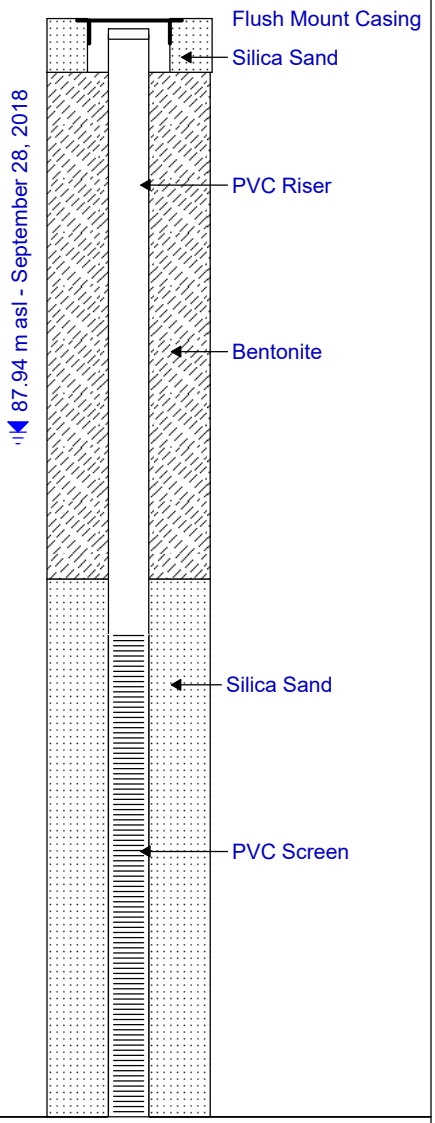
Borehole/Monitoring Well ID: BH18-28 (MW18-28)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	90.21
0–2 / 0–0.5	4-8-12-13	BH18-28-1		<5/<5	80		TOPSOIL dry to moist, dark brown, asphalt pieces from 0.4 m bgs to 0.5 m bgs	
3–4 / 1	7-11-9-10	BH18-28-2	◆	<5/<5	95		SILT and SAND FILL dry to moist, light brown / red	89.00
5							TOPSOIL	
6–7 / 2	3-9-8-6	BH18-28-3		<5/<5	75		GRAVEL and SILT FILL black staining (sheen) from 1.8 m bgs to 2.1 m bgs, white rocks	88.00
8							SAND and SILT FILL moist to wet, brown / red, black staining (sheen) at 2.9 m bgs	
9	1-1-1-1	BH18-28-4		<5/<5	39			
10–11 / 3	1-1-1-1	BH18-28-5	◆	<5/11	64		GRAVEL and SAND FILL wet, black, some silt	87.00
12–13 / 4							silty SAND FILL wet, dark brown, trace clay, black staining from 3.8 m bgs to 4.4 m bgs	
14	2-1-1-1	BH18-28-6		<5/7	39			86.00
15–16 / 5	2-1-1-1	BH18-28-7		<5/<5	100		dark grey, trace clay, black staining (sheen) from 5.1 m bgs to 5.2 m bgs	
17								85.00
18–19	0-1-0-1	BH18-28-8		<5/6	39			



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

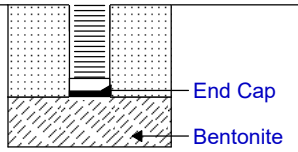
Borehole/Monitoring Well ID: BH18-28 (MW18-28)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
20–22	2-2-2-2	BH18-28-9	◆	<5/11	52		SAND and GRAVEL FILL wet, dark brown, some silt, trace clay, black staining (sheen) and rocks from 5.3 m bgs to 5.9 m bgs	84.00
22–24							silty SAND FILL wet, dark brown, trace gravel, black staining from 6.1 m bgs to 6.7 m bgs	83.00
25–39							End of Borehole at 6.7 m bgs.	82.00 / 81.00 / 80.00 / 79.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

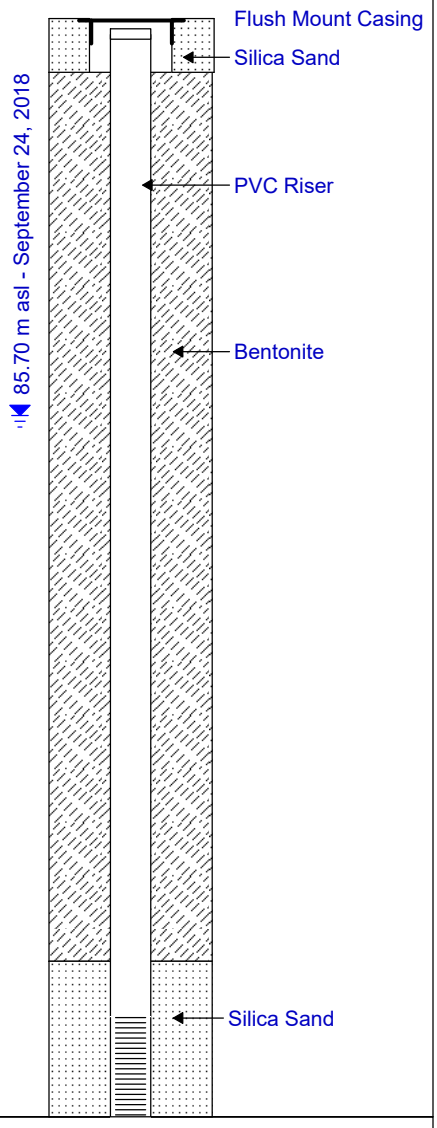
Borehole/Monitoring Well ID: BH18-29 (MW18-29)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	87.88
0 / 0	1-3-3-2	BH18-28-1		<5/<5	90		silty SAND and TOPSOIL FILL dry to moist, dark brown, trace clay, black staining (sheen) and oxidation at 0.5 m bgs	
3 / 1	1-2-3-2	BH18-29-2	◆	<5/6	56		silty SAND FILL moist to wet, dark brown, trace clay, black staining from 1.2 m bgs to 1.4 m bgs	87.00
6 / 2	1-1-1-1	BH18-29-3	◆	<5/8	85		wet, dark brown, some clay, black staining (sheen) from 1.5 m bgs to 2.1 m bgs	86.00
9 / 3	0-0-1-1	BH18-29-4	◆	<5/<5	80			85.00
11 / 3	0-0-1-1	BH18-29-5		<5/6	100		black staining (sheen) from 3.0 m bgs to 3.4 m bgs	
12 / 4	1-0-1-1	BH18-29-6		<5/10	33		SAND and GRAVEL FILL red / brown, black staining (sheen) from 3.6 m bgs to 3.7 m bgs	84.00
15 / 4							silty SAND FILL wet, dark brown, black staining (sheen) from 3.8 m bgs to 4.4 m bgs	
16 / 5	1-2-1-2	BH18-29-7	◆	<5/11	48		some gravel, trace clay, black staining (sheen) from 4.6 m bgs to 5.2 mbgs	83.00
18 / 5							trace gravel, black staining (sheen) from 5.3 m bgs to 5.9 m bgs	
19 / 5	2-3-2-2	BH18-29-8		<5/6	39			82.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

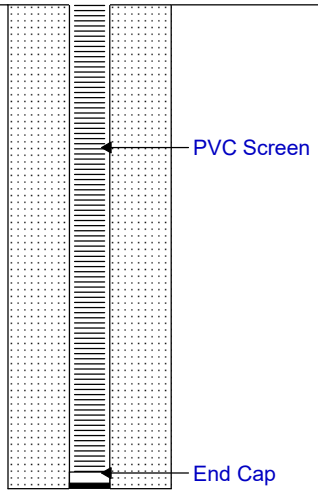
Borehole/Monitoring Well ID: BH18-29 (MW18-29)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 13, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
6							dark brown / red, trace clay, dark grey staining from 6.2 mbgs to 6.4 m bgs, sheen from 6.6 m bgs to 6.7 m bgs	
7	2-1-2-2	BH18-29-9		<5/10	80		some clay	81.00
8	1-2-2-2	BH18-29-10		<5/22	100		some wood pieces at 8.1 m bgs, some blakc staining from 7.9 m bgs to 8.2 m bgs	80.00
9	1-0-2-2	BH18-29-11		<5/<5	69		dark brown / grey	79.00
10	2-3-2-2	BH18-29-12	◆	<5/<5	89		End of Borehole at 9.0 m bgs.	78.00
11								77.00
								76.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

SNC·LAVALIN

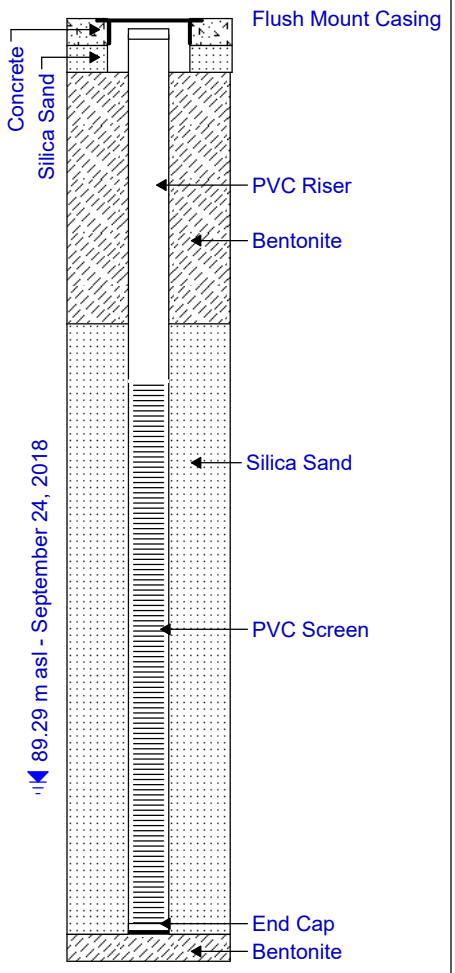
Borehole/Monitoring Well ID: BH18-30 (MW18-30)

Project No.: 655184
Client: City of Hamilton
Location: Central Park, Hamilton, ON
Date Completed: September 14, 2018
Site Datum: Geodetic Benchmark No. 176 (85.483 m asl) J.D Barnes 2018

Supervisor: ABK
Drilling Method: Hollow Stem Auger
Borehole Diameter: 20.3 cm
Monitoring Well Diameter: 5.1 cm

Drilling Company: Landshark Drilling Inc.
Drilling Equipment: B57
Well Casing: Flush Mount Casing
Well Screen: 5.1 cm PVC size 10 slot
OVM/PID: RKI Eagle 2

DEPTH (ft / m)	BLOW COUNT (1)	SAMPLE ID	SAMPLE LOCATION	OVM / PID (2)	RECOVERY (%)	GRAPHIC LOG	DESCRIPTION	ELEVATION (m)
							Ground Surface	93.48
0–3 / 0–1	10-11-8-7	BH18-30-1	◆	<5/<5	72		SAND FILL dry to moist, dark brown / red / grey, some silt	93.00
3–6 / 1–2	7-8-8-10	BH18-30-2	◆	<5/<5	72			
6–9 / 2–3	4-8-12-9	BH18-30-3	◆	<5/<5	64		silty SAND FILL dry to moist, dark red, some silt	92.00
9–12 / 3–4	4-8-9-10	BH18-30-4		<5/<5	84		SAND FILL dry to moist, dark red, some silt moist, dark brown / red, some silt	91.00
12–15 / 4–5	5-12-10-9	BH18-30-5	◆	<5/<5	56			90.00
15–18 / 5–6	4-6-6-5	BH18-30-6	◆	<5/<5	64		silty SAND FILL moist to wet, dark brown / red, some black staining (sheen) from 3.8 m bgs to 4.4 m bgs	89.00
18–21 / 6–7	3-7-13-13	BH18-30-7	◆	<5/<5	72		SAND wet, dark brown / red, some silt, some black staining from 4.6 m bgs to 5.2 m bgs	
							End of Borehole at 5.2 m bgs.	88.00



(1) Blow count per 0.15 m using conventional hammer and split spoons
(2) Organic Vapour Meter (OVM) and/or Photoionization Detector (PID) readings (in ppmv unless noted)

All elevations and locations are approximate.

Monitoring well equipped with dedicated inertial foot valve and polyethylene tubing for sampling.

◆ = Sample submitted for laboratory analysis

NA = Not Applicable

Appendix D

Hydraulic Conductivity Test Analysis

SNC-Lavalin Inc.
235 Lesmill Road
Toronto, Ontario, M3B 2V1

Slug Test - Water Level Data

Project: Central Park, Hamilton

Number: 655184

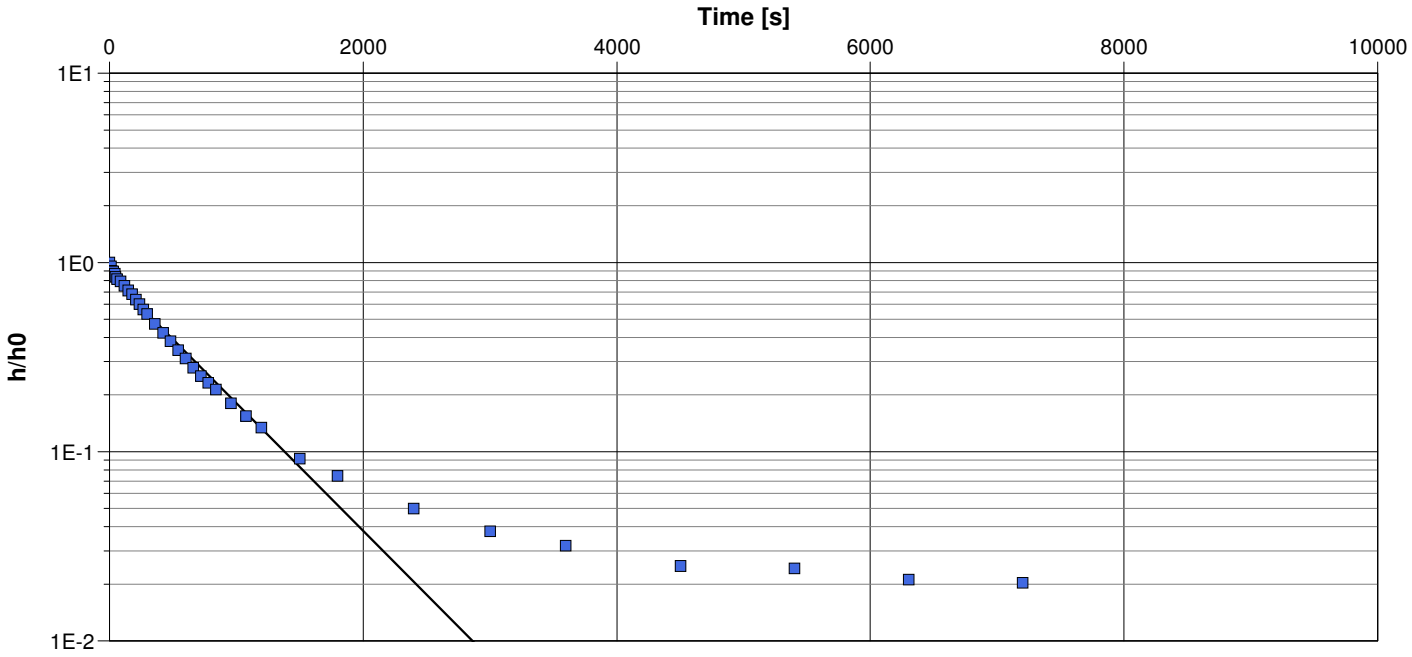
Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-02	Test Well: MW18-02
Test Conducted by: JP	Test Date: 2018/09/12	
Water level at t=0 [m]: 5.60	Static Water Level [m]: 2.99	Water level change at t=0 [m]: 2.60

	Time [s]	Water Level [m]	WL Change [m]
1	0	5.596	2.602
2	10	5.475	2.481
3	20	5.348	2.354
4	30	5.324	2.33
5	40	5.258	2.264
6	50	5.182	2.188
7	60	5.123	2.129
8	90	5.063	2.069
9	120	4.951	1.957
10	150	4.846	1.852
11	180	4.756	1.762
12	210	4.656	1.662
13	240	4.555	1.561
14	270	4.467	1.473
15	300	4.386	1.392
16	360	4.232	1.238
17	420	4.103	1.109
18	480	3.994	1.00
19	540	3.884	0.89
20	600	3.799	0.805
21	660	3.718	0.724
22	720	3.645	0.651
23	780	3.598	0.604
24	840	3.546	0.552
25	960	3.464	0.47
26	1080	3.396	0.402
27	1200	3.342	0.348
28	1500	3.233	0.239
29	1800	3.187	0.193
30	2400	3.124	0.13
31	3000	3.093	0.099
32	3600	3.077	0.083
33	4500	3.059	0.065
34	5400	3.057	0.063
35	6300	3.049	0.055
36	7200	3.047	0.053

SNC-Lavalin Inc. 235 Lesmill Road Toronto, Ontario, M3B 2V1	**Slug Test Analysis Report**
	Project: Central Park, Hamilton
	Number: 655184
	Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-02	Test Well: MW18-02
Test Conducted by: JP		Test Date: 2018/09/12
Analysis Performed by: WL	K Analysis MW18-02	Analysis Date: 2018/10/19
Aquifer Thickness: 4.81 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW18-02	6.58×10^{-7}	

SNC-Lavalin Inc.
235 Lesmill Road
Toronto, Ontario, M3B 2V1

Project: Central Park, Hamilton

Number: 655184

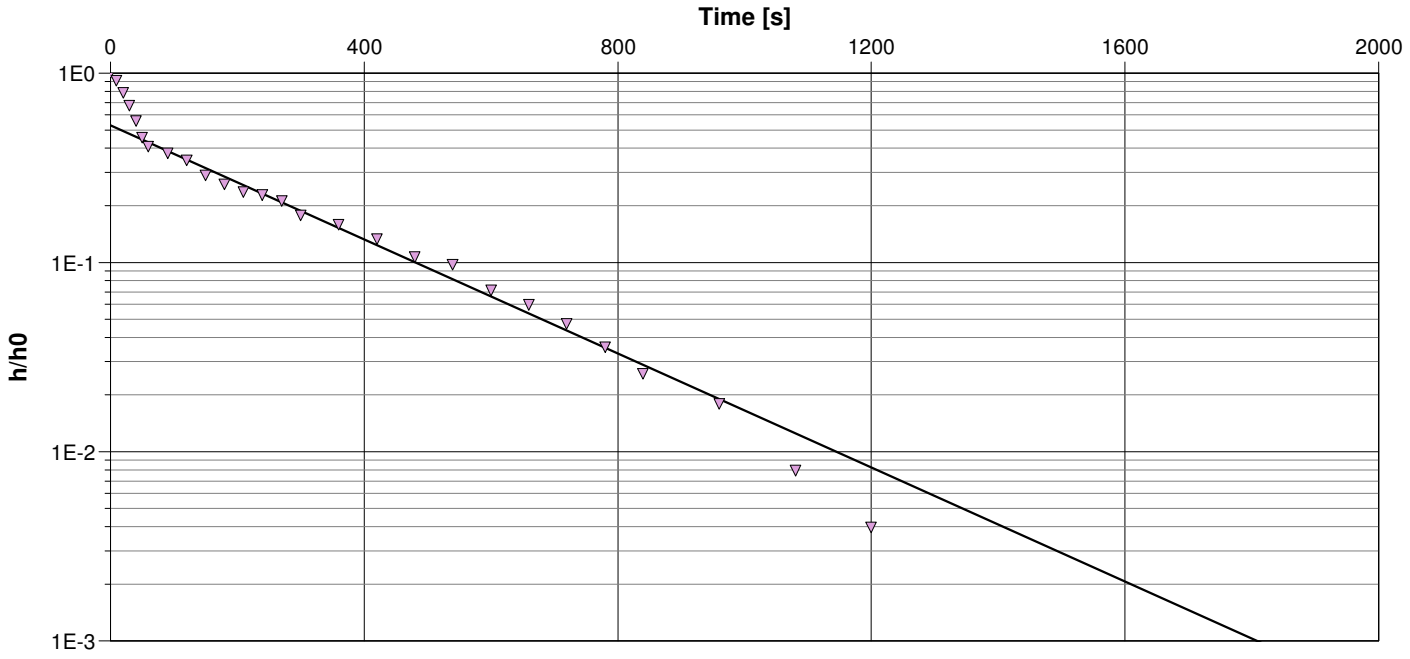
Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-14	Test Well: MW18-14
Test Conducted by:	Test Date: 2018/09/13	
Water level at t=0 [m]: 4.70	Static Water Level [m]: 4.20	Water level change at t=0 [m]: 0.50

	Time [s]	Water Level [m]	WL Change [m]
1	0	4.699	0.504
2	10	4.655	0.46
3	20	4.591	0.396
4	30	4.533	0.338
5	40	4.478	0.283
6	50	4.425	0.23
7	60	4.401	0.206
8	90	4.385	0.19
9	120	4.369	0.174
10	150	4.341	0.146
11	180	4.325	0.13
12	210	4.314	0.119
13	240	4.309	0.114
14	270	4.301	0.106
15	300	4.284	0.089
16	360	4.275	0.08
17	420	4.262	0.067
18	480	4.249	0.054
19	540	4.244	0.049
20	600	4.231	0.036
21	660	4.225	0.03
22	720	4.219	0.024
23	780	4.213	0.018
24	840	4.208	0.013
25	960	4.204	0.009
26	1080	4.199	0.004
27	1200	4.197	0.002
28	1500	4.195	0.00

SNC-Lavalin Inc. 235 Lesmill Road Toronto, Ontario, M3B 2V1	**Slug Test Analysis Report**
	Project: Central Park, Hamilton
	Number: 655184
	Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-14	Test Well: MW18-14
Test Conducted by:		Test Date: 2018/09/13
Analysis Performed by: WL	MW18-14	Analysis Date: 2018/11/08
Aquifer Thickness: 0.98 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW18-14	1.07×10^{-6}	

SNC-Lavalin Inc.
235 Lesmill Road
Toronto, Ontario, M3B 2V1

Slug Test - Water Level Data

Project: Central Park, Hamilton

Number: 655184

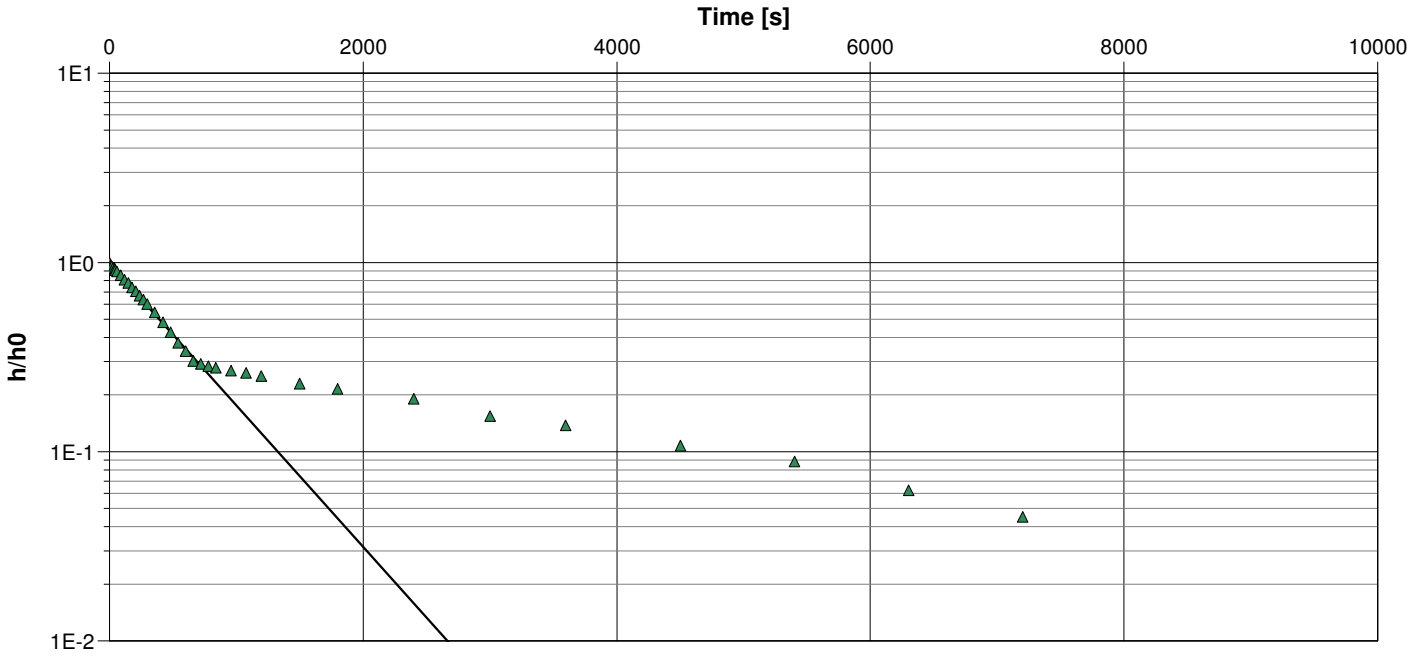
Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-16	Test Well: MW18-16
Test Conducted by:	Test Date: 2018/09/12	
Water level at t=0 [m]: 6.50	Static Water Level [m]: 4.65	Water level change at t=0 [m]: 1.86

	Time [s]	Water Level [m]	WL Change [m]
1	0	6.505	1.857
2	10	6.443	1.795
3	20	6.423	1.775
4	30	6.39	1.742
5	40	6.371	1.723
6	50	6.344	1.696
7	60	6.305	1.657
8	90	6.238	1.59
9	120	6.154	1.506
10	150	6.096	1.448
11	180	6.023	1.375
12	210	5.954	1.306
13	240	5.886	1.238
14	270	5.828	1.18
15	300	5.763	1.115
16	360	5.657	1.009
17	420	5.548	0.90
18	480	5.444	0.796
19	540	5.349	0.701
20	600	5.281	0.633
21	660	5.21	0.562
22	720	5.189	0.541
23	780	5.176	0.528
24	840	5.166	0.518
25	960	5.145	0.497
26	1080	5.131	0.483
27	1200	5.114	0.466
28	1500	5.073	0.425
29	1800	5.048	0.40
30	2400	5.003	0.355
31	3000	4.933	0.285
32	3600	4.904	0.256
33	4500	4.848	0.20
34	5400	4.812	0.164
35	6300	4.764	0.116
36	7200	4.732	0.084

SNC-Lavalin Inc. 235 Lesmill Road Toronto, Ontario, M3B 2V1	**Slug Test Analysis Report**
	Project: Central Park, Hamilton
	Number: 655184
	Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-16	Test Well: MW18-16
Test Conducted by:		Test Date: 2018/09/12
Analysis Performed by: WL	K Analysis MW18-16	Analysis Date: 2018/10/19
Aquifer Thickness: 2.40 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW18-16	6.47×10^{-7}	

SNC-Lavalin Inc.
235 Lesmill Road
Toronto, Ontario, M3B 2V1

Slug Test - Water Level Data

Project: Central Park, Hamilton

Number: 655184

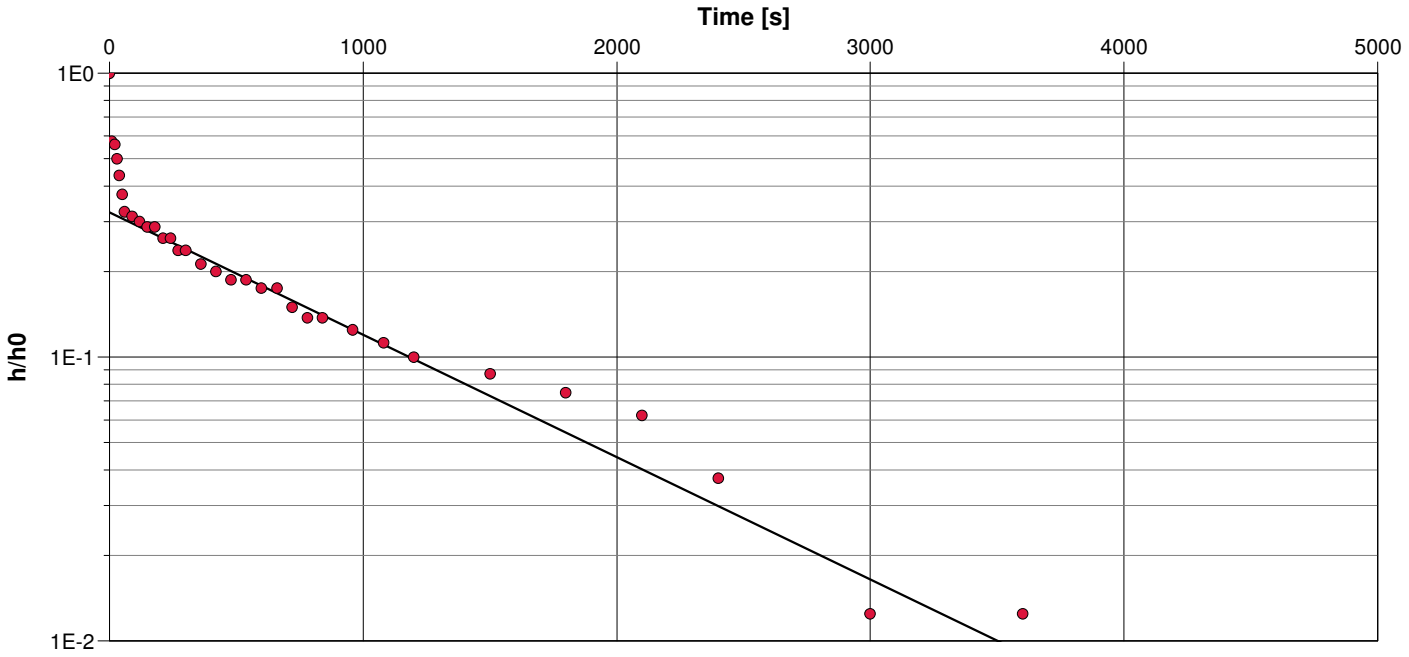
Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-04	Test Well: MW18-04
Test Conducted by: JP	Test Date: 2018/09/13	
Water level at t=0 [m]: 3.56	Static Water Level [m]: 3.48	Water level change at t=0 [m]: 0.08

	Time [s]	Water Level [m]	WL Change [m]
1	0	3.555	0.08
2	10	3.521	0.046
3	20	3.52	0.045
4	30	3.515	0.04
5	40	3.51	0.035
6	50	3.505	0.03
7	60	3.501	0.026
8	90	3.50	0.025
9	120	3.499	0.024
10	150	3.498	0.023
11	180	3.498	0.023
12	210	3.496	0.021
13	240	3.496	0.021
14	270	3.494	0.019
15	300	3.494	0.019
16	360	3.492	0.017
17	420	3.491	0.016
18	480	3.49	0.015
19	540	3.49	0.015
20	600	3.489	0.014
21	660	3.489	0.014
22	720	3.487	0.012
23	780	3.486	0.011
24	840	3.486	0.011
25	960	3.485	0.01
26	1080	3.484	0.009
27	1200	3.483	0.008
28	1500	3.482	0.007
29	1800	3.481	0.006
30	2100	3.48	0.005
31	2400	3.478	0.003
32	3000	3.476	0.001
33	3600	3.476	0.001
34	4500	3.475	0.00

SNC-Lavalin Inc. 235 Lesmill Road Toronto, Ontario, M3B 2V1	**Slug Test Analysis Report**
	Project: Central Park, Hamilton
	Number: 655184
	Client: City of Hamilton

Location: 171 Bay St N, Hamilton	Slug Test: K Test MW18-04	Test Well: MW18-04
Test Conducted by: JP		Test Date: 2018/09/13
Analysis Performed by: WL	K Analysis MW18-04	Analysis Date: 2018/10/19
Aquifer Thickness: 1.87 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
MW18-04	3.55×10^{-7}	

Appendix E

Laboratory Certificates of Analysis (Soil)

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 30-AUG-18
Report Date: 10-SEP-18 15:41 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2156982

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 14-469158, 14-469159
Legal Site Desc:

Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ANALYTICAL REPORT

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)						
L2156982-11	BH18-02-2	Metals	Copper (Cu)	446	230	ug/g
			Lead (Pb)	727	120	ug/g
			Zinc (Zn)	427	340	ug/g
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
(No parameter exceedances)						

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

		Guide Limits									
Lab ID				L2156982-1	L2156982-2	L2156982-3	L2156982-4	L2156982-6	L2156982-11	L2156982-12	L2156982-13	L2156982-14
Sample Date				29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
Sample ID				BH18-01-2	BH18-01-6	BH18-01-8	BH18-01-9	BH18-01-16	BH18-02-2	BH18-02-5	BH18-02-6	BH18-02-9
Analyte	**Unit**	**#1**	**#2**									
Conductivity	mS/cm	1.4	-	0.651					0.218			
% Moisture	%	-	-	14.9	8.67	22.1	16.9	19.9	16.2	23.1	24.0	15.4
pH	pH units	-	-	7.70					8.08			

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2156982-15	Lab ID: L2156982-16
				Sample Date: 29-AUG-18	Sample Date: 29-AUG-18
				Sample ID: BH18-02-9/10	Sample ID: BH18-02-12
Conductivity	mS/cm	1.4	-		
% Moisture	%	-	-	15.4	18.3
pH	pH units	-	-		

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - SOIL

		Guide Limits			
Lab ID				L2156982-1	L2156982-11
Sample Date				29-AUG-18	29-AUG-18
Sample ID				BH18-01-2	BH18-02-2
Analyte	**Unit**	**#1**	**#2**		
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

		Guide Limits			
Lab ID				L2156982-1	L2156982-11
Sample Date				29-AUG-18	29-AUG-18
Sample ID				BH18-01-2	BH18-02-2
Analyte	**Unit**	**#1**	**#2**		
SAR	SAR	12	-	11.0	0.28
Calcium (Ca)	mg/L	-	-	5.3	9.1
Magnesium (Mg)	mg/L	-	-	5.6	2.4
Sodium (Na)	mg/L	-	-	153	3.7

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2156982-1 / Sample Date: 29-AUG-18 / Sample ID: BH18-01-2	Lab ID: L2156982-4 / Sample Date: 29-AUG-18 / Sample ID: BH18-01-9	Lab ID: L2156982-11 / Sample Date: 29-AUG-18 / Sample ID: BH18-02-2	Lab ID: L2156982-13 / Sample Date: 29-AUG-18 / Sample ID: BH18-02-6
Antimony (Sb)	ug/g	40	63	<1.0	<1.0	12.1	<1.0
Arsenic (As)	ug/g	18	47	6.4	3.5	9.5	4.4
Barium (Ba)	ug/g	670	7700	75.6	30.6	103	43.5
Beryllium (Be)	ug/g	8	60	0.52	<0.50	<0.50	<0.50
Boron (B)	ug/g	120	5000	11.2	7.4	9.5	5.9
Boron (B), Hot Water Ext.	ug/g	2	5000	0.87	0.28	0.52	0.52
Cadmium (Cd)	ug/g	1.9	7.9	<0.50	<0.50	1.23	<0.50
Chromium (Cr)	ug/g	160	11000	22.2	10.5	23.1	12.5
Cobalt (Co)	ug/g	80	2500	7.4	6.0	7.5	7.2
Copper (Cu)	ug/g	230	5600	50.7	19.8	446	30.7
Lead (Pb)	ug/g	120	1000	66.0	7.2	727	18.1
Mercury (Hg)	ug/g	3.9	13	0.122	0.0087	0.774 DLHC	0.0278
Molybdenum (Mo)	ug/g	40	1200	1.4	<1.0	<1.0	<1.0
Nickel (Ni)	ug/g	270	510	19.0	11.3	31.0	14.2
Selenium (Se)	ug/g	5.5	1200	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	40	490	<0.20	<0.20	0.54	<0.20
Thallium (Tl)	ug/g	3.3	33	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	300	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	160	27.7	19.6	25.5	23.1
Zinc (Zn)	ug/g	340	15000	121	32.5	427	49.4

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

			Lab ID	L2156982-1	L2156982-4	L2156982-11	L2156982-13
			Sample Date	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
			Sample ID	BH18-01-2	BH18-01-9	BH18-02-2	BH18-02-6
		Guide Limits					
Analyte	Unit	#1	#2				
Chromium, Hexavalent	ug/g	8	40	<0.20	<0.20	0.45	0.28

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

				Lab ID	L2156982-2	L2156982-3	L2156982-6	L2156982-12	L2156982-14
				Sample Date	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
				Sample ID	BH18-01-6	BH18-01-8	BH18-01-16	BH18-02-5	BH18-02-9
Analyte	Unit	Guide Limits #1	#2						
Acetone	ug/g	16	16	<0.50	<0.50	<0.50		<0.50
Benzene	ug/g	0.32	6.1	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Bromodichloromethane	ug/g	18	50	<0.050	<0.050	<0.050		<0.050
Bromoform	ug/g	0.61	2	<0.050	<0.050	<0.050		<0.050
Bromomethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050		<0.050
Carbon tetrachloride	ug/g	0.21	0.43	<0.050	<0.050	<0.050		<0.050
Chlorobenzene	ug/g	2.4	2.4	<0.050	<0.050	<0.050		<0.050
Dibromochloromethane	ug/g	13	48	<0.050	<0.050	<0.050		<0.050
Chloroform	ug/g	0.47	0.85	<0.050	<0.050	<0.050		<0.050
1,2-Dibromoethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050		<0.050
1,2-Dichlorobenzene	ug/g	6.8	60	<0.050	<0.050	<0.050		<0.050
1,3-Dichlorobenzene	ug/g	9.6	59	<0.050	<0.050	<0.050		<0.050
1,4-Dichlorobenzene	ug/g	0.2	0.39	<0.050	<0.050	<0.050		<0.050
Dichlorodifluoromethane	ug/g	16	16	<0.050	<0.050	<0.050		<0.050
1,1-Dichloroethane	ug/g	17	120	<0.050	<0.050	<0.050		<0.050
1,2-Dichloroethane	ug/g	0.05	0.055	<0.050	<0.050	<0.050		<0.050
1,1-Dichloroethylene	ug/g	0.064	0.12	<0.050	<0.050	<0.050		<0.050
cis-1,2-Dichloroethylene	ug/g	55	110	<0.050	<0.050	<0.050		<0.050
trans-1,2-Dichloroethylene	ug/g	1.3	2.9	<0.050	<0.050	<0.050		<0.050
Methylene Chloride	ug/g	1.6	3	<0.050	<0.050	<0.050		<0.050
1,2-Dichloropropane	ug/g	0.16	0.33	<0.050	<0.050	<0.050		<0.050
cis-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030		<0.030
trans-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030		<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.18	0.4	<0.042	<0.042	<0.042		<0.042
Ethylbenzene	ug/g	9.5	17	<0.018	<0.018	<0.018	<0.018	<0.018
n-Hexane	ug/g	46	54	<0.050	<0.050	<0.050		<0.050
Methyl Ethyl Ketone	ug/g	70	150	<0.50	<0.50	<0.50		<0.50
Methyl Isobutyl Ketone	ug/g	31	64	<0.50	<0.50	<0.50		<0.50
MTBE	ug/g	11	14	<0.050	<0.050	<0.050		<0.050
Styrene	ug/g	34	66	<0.050	<0.050	<0.050		<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

			Lab ID	L2156982-2	L2156982-3	L2156982-6	L2156982-12	L2156982-14
			Sample Date	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
			Sample ID	BH18-01-6	BH18-01-8	BH18-01-16	BH18-02-5	BH18-02-9
		Guide Limits						
Analyte	Unit	#1	#2					
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.24	<0.050	<0.050	<0.050		<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050		<0.050
Tetrachloroethylene	ug/g	4.5	9.5	<0.050	<0.050	<0.050		<0.050
Toluene	ug/g	68	68	<0.080	<0.080	<0.080	<0.080	<0.080
1,1,1-Trichloroethane	ug/g	6.1	9.8	<0.050	<0.050	<0.050		<0.050
1,1,2-Trichloroethane	ug/g	0.05	0.068	<0.050	<0.050	<0.050		<0.050
Trichloroethylene	ug/g	0.91	1.8	<0.010	<0.010	<0.010		<0.010
Trichlorofluoromethane	ug/g	4	4	<0.050	<0.050	<0.050		<0.050
Vinyl chloride	ug/g	0.032	0.057	<0.020	<0.020	<0.020		<0.020
o-Xylene	ug/g	-	-	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylenes	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Xylenes (Total)	ug/g	26	26	<0.050	<0.050	<0.050	<0.050	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	100.4	100.9	100.7	93.4	99.5
Surrogate: 1,4-Difluorobenzene	%	-	-	108.5	109.5	111.1	88.5	109.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Hydrocarbons - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2156982-3	L2156982-6	L2156982-12	L2156982-14	L2156982-15
				Sample Date	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
				Sample ID	BH18-01-8	BH18-01-16	BH18-02-5	BH18-02-9	BH18-02-9/10
F1 (C6-C10)	ug/g	55	55		<5.0	<5.0	<5.0	<5.0	
F1-BTEX	ug/g	55	55		<5.0	<5.0	<5.0		
F2 (C10-C16)	ug/g	230	230		<10	<10	<10		<10
F2-Naphth	ug/g	-	-		<10	<10	<10		
F3 (C16-C34)	ug/g	1700	5800		<50	<50	<50		<50
F3-PAH	ug/g	-	-		<50	<50	<50		
F4 (C34-C50)	ug/g	3300	6900		<50	<50	<50		<50
Total Hydrocarbons (C6-C50)	ug/g	-	-		<72	<72	<72		
Chrom. to baseline at nC50		-	-		YES	YES	YES		YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-		90.9	97.7	94.6		94.6
Surrogate: 3,4-Dichlorotoluene	%	-	-		82.6	81.2	95.4	72.4	

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

		Guide Limits					
Lab ID				L2156982-3	L2156982-6	L2156982-12	L2156982-16
Sample Date				29-AUG-18	29-AUG-18	29-AUG-18	29-AUG-18
Sample ID				BH18-01-8	BH18-01-16	BH18-02-5	BH18-02-12
Analyte	**Unit**	**#1**	**#2**				
Acenaphthene	ug/g	96	330	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	ug/g	0.15	0.15	<0.050	<0.050	<0.050	<0.050
Anthracene	ug/g	0.67	0.67	<0.050	<0.050	<0.050	<0.050
Benzo(a)anthracene	ug/g	0.96	36	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	ug/g	0.3	3.6	<0.050	<0.050	<0.050	<0.050
Benzo(b)fluoranthene	ug/g	0.96	36	<0.050	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	ug/g	9.6	360	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	ug/g	0.96	36	<0.050	<0.050	<0.050	<0.050
Chrysene	ug/g	9.6	360	<0.050	<0.050	<0.050	<0.050
Dibenzo(ah)anthracene	ug/g	0.1	3.6	<0.050	<0.050	<0.050	<0.050
Fluoranthene	ug/g	9.6	360	<0.050	<0.050	<0.050	<0.050
Fluorene	ug/g	62	62	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	ug/g	0.76	36	<0.050	<0.050	<0.050	<0.050
1+2-Methylnaphthalenes	ug/g	76	76	<0.042	<0.042	<0.042	<0.042
1-Methylnaphthalene	ug/g	76	76	<0.030	<0.030	<0.030	<0.030
2-Methylnaphthalene	ug/g	76	76	<0.030	<0.030	<0.030	<0.030
Naphthalene	ug/g	9.6	200	<0.013	<0.013	<0.013	<0.013
Phenanthrene	ug/g	12	270	<0.046	<0.046	<0.046	<0.046
Pyrene	ug/g	96	2600	<0.050	<0.050	<0.050	<0.050
Surrogate: 2-Fluorobiphenyl	%	-	-	91.5	93.3	91.1	92.1
Surrogate: p-Terphenyl d14	%	-	-	86.4	96.3	87.8	92.9

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

14-469158 14-469159

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2156982 Report Date: 10-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4203983								
WG2868975-4 DUP		**L2156594-7**						
Boron (B), Hot Water Ext.		0.40	0.39		ug/g	1.3	30	06-SEP-18
WG2868975-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			83.4		%		70-130	06-SEP-18
WG2868975-3 LCS								
Boron (B), Hot Water Ext.			118.1		%		70-130	06-SEP-18
WG2868975-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	06-SEP-18
Batch R4203985								
WG2868802-4 DUP		**L2156664-3**						
Boron (B), Hot Water Ext.		<0.10	<0.10	RPD-NA	ug/g	N/A	30	06-SEP-18
WG2868802-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			85.0		%		70-130	06-SEP-18
WG2868802-3 LCS								
Boron (B), Hot Water Ext.			122.1		%		70-130	06-SEP-18
WG2868802-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	06-SEP-18
BTX-511-HS-WT	**Soil**							
Batch R4203520								
WG2865278-4 DUP		**WG2865278-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	06-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	06-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	06-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	06-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	06-SEP-18
WG2865278-2 LCS								
Benzene			99.3		%		70-130	06-SEP-18
Ethylbenzene			98.4		%		70-130	06-SEP-18
m+p-Xylenes			98.4		%		70-130	06-SEP-18
o-Xylene			98.5		%		70-130	06-SEP-18
Toluene			97.1		%		70-130	06-SEP-18
WG2865278-1 MB								
Benzene			<0.0068		ug/g		0.0068	06-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	06-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	06-SEP-18
o-Xylene			<0.020		ug/g		0.02	06-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R4203520								
WG2865278-1 MB								
Toluene			<0.080		ug/g		0.08	06-SEP-18
Surrogate: 1,4-Difluorobenzene			104.0		%		50-140	06-SEP-18
Surrogate: 4-Bromofluorobenzene			110.3		%		50-140	06-SEP-18
WG2865278-5 MS		**L2154238-87**						
Benzene			105.8		%		60-140	06-SEP-18
Ethylbenzene			104.2		%		60-140	06-SEP-18
m+p-Xylenes			104.1		%		60-140	06-SEP-18
o-Xylene			104.0		%		60-140	06-SEP-18
Toluene			102.7		%		60-140	06-SEP-18
CN-WAD-R511-WT	**Soil**							
Batch R4203931								
WG2867753-5 DUP		**L2156634-4**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	06-SEP-18
WG2867753-2 LCS								
Cyanide, Weak Acid Diss			98.2		%		80-120	06-SEP-18
WG2867753-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	06-SEP-18
WG2867753-6 MS		**L2156634-4**						
Cyanide, Weak Acid Diss			103.3		%		70-130	06-SEP-18
CR-CR6-IC-WT	**Soil**							
Batch R4203942								
WG2867836-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			93.9		%		70-130	06-SEP-18
WG2868208-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			93.4		%		70-130	06-SEP-18
WG2867836-3 DUP		**L2156786-6**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	06-SEP-18
WG2868208-3 DUP		**L2156937-1**						
Chromium, Hexavalent		0.28	0.20		ug/g	30	35	06-SEP-18
WG2867836-2 LCS								
Chromium, Hexavalent			97.7		%		80-120	06-SEP-18
WG2868208-2 LCS								
Chromium, Hexavalent			103.0		%		80-120	06-SEP-18
WG2867836-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	06-SEP-18
WG2868208-1 MB								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	**Soil**							
Batch R4203942								
WG2868208-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	06-SEP-18
Batch R4205054								
WG2869542-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			91.4		%		70-130	07-SEP-18
WG2869542-3 DUP		**L2156968-1**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	07-SEP-18
WG2869542-2 LCS								
Chromium, Hexavalent			99.3		%		80-120	07-SEP-18
WG2869542-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	07-SEP-18
EC-WT	**Soil**							
Batch R4203996								
WG2868972-4 DUP		**WG2868972-3**						
Conductivity		0.114	0.112		mS/cm	1.2	20	06-SEP-18
WG2868972-2 IRM		**WT SAR2**						
Conductivity			92.4		%		70-130	06-SEP-18
WG2869207-1 LCS								
Conductivity			97.2		%		90-110	06-SEP-18
WG2868972-1 MB								
Conductivity			<0.0040		mS/cm		0.004	06-SEP-18
Batch R4203998								
WG2868818-4 DUP		**WG2868818-3**						
Conductivity		0.192	0.198		mS/cm	2.9	20	06-SEP-18
WG2868818-2 IRM		**WT SAR2**						
Conductivity			98.6		%		70-130	06-SEP-18
WG2869200-1 LCS								
Conductivity			95.3		%		90-110	06-SEP-18
WG2868818-1 MB								
Conductivity			<0.0040		mS/cm		0.004	06-SEP-18
F1-HS-511-WT	**Soil**							
Batch R4201927								
WG2866828-4 DUP		**WG2866828-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	05-SEP-18
WG2866828-2 LCS								
F1 (C6-C10)			94.7		%		80-120	05-SEP-18
WG2866828-1 MB								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R4201927								
WG2866828-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	05-SEP-18
Surrogate: 3,4-Dichlorotoluene			90.4		%		60-140	05-SEP-18
WG2866828-6 MS		**L2156786-25**						
F1 (C6-C10)			N/A	E	%		-	05-SEP-18
Batch R4202490								
WG2866812-4 DUP		**WG2866812-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	05-SEP-18
WG2866812-2 LCS								
F1 (C6-C10)			93.5		%		80-120	05-SEP-18
WG2866812-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	05-SEP-18
Surrogate: 3,4-Dichlorotoluene			83.8		%		60-140	05-SEP-18
WG2866812-6 MS		**L2156561-2**						
F1 (C6-C10)			88.4		%		60-140	05-SEP-18
Batch R4203520								
WG2865278-4 DUP		**WG2865278-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	06-SEP-18
WG2865278-2 LCS								
F1 (C6-C10)			103.3		%		80-120	06-SEP-18
WG2865278-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	06-SEP-18
Surrogate: 3,4-Dichlorotoluene			115.2		%		60-140	06-SEP-18
WG2865278-6 MS		**L2154238-91**						
F1 (C6-C10)			109.2		%		60-140	06-SEP-18
F2-F4-511-WT	**Soil**							
Batch R4204037								
WG2867383-3 DUP		**WG2867383-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	06-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	06-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	06-SEP-18
WG2867383-2 LCS								
F2 (C10-C16)			114.0		%		80-120	06-SEP-18
F3 (C16-C34)			109.8		%		80-120	06-SEP-18
F4 (C34-C50)			116.7		%		80-120	06-SEP-18
WG2867383-1 MB								
F2 (C10-C16)			<10		ug/g		10	06-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4204037								
WG2867383-1 MB								
F3 (C16-C34)			<50		ug/g		50	06-SEP-18
F4 (C34-C50)			<50		ug/g		50	06-SEP-18
Surrogate: 2-Bromobenzotrifluoride			97.6		%		60-140	06-SEP-18
WG2867383-4 MS		**WG2867383-5**						
F2 (C10-C16)			111.1		%		60-140	06-SEP-18
F3 (C16-C34)			109.6		%		60-140	06-SEP-18
F4 (C34-C50)			110.6		%		60-140	06-SEP-18
Batch R4204681								
WG2866774-3 DUP		**WG2866774-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	07-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
WG2866774-2 LCS								
F2 (C10-C16)			113.3		%		80-120	07-SEP-18
F3 (C16-C34)			115.0		%		80-120	07-SEP-18
F4 (C34-C50)			104.2		%		80-120	07-SEP-18
WG2866774-1 MB								
F2 (C10-C16)			<10		ug/g		10	07-SEP-18
F3 (C16-C34)			<50		ug/g		50	07-SEP-18
F4 (C34-C50)			<50		ug/g		50	07-SEP-18
Surrogate: 2-Bromobenzotrifluoride			89.9		%		60-140	07-SEP-18
WG2866774-4 MS		**WG2866774-5**						
F2 (C10-C16)			98.5		%		60-140	07-SEP-18
F3 (C16-C34)			99.8		%		60-140	07-SEP-18
F4 (C34-C50)			102.1		%		60-140	07-SEP-18
HG-200.2-CVAA-WT	**Soil**							
Batch R4203811								
WG2868968-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			106.9		%		70-130	06-SEP-18
WG2868968-6 DUP		**WG2868968-5**						
Mercury (Hg)		0.774	0.816		ug/g	5.3	40	06-SEP-18
WG2868968-3 LCS								
Mercury (Hg)			107.0		%		80-120	06-SEP-18
WG2868968-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-WT	**Soil**							
Batch R4203814								
WG2868779-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			103.4		%		70-130	06-SEP-18
WG2868779-6 DUP		**WG2868779-5**						
Mercury (Hg)		<0.0050	0.0055	RPD-NA	ug/g	N/A	40	06-SEP-18
WG2868779-3 LCS								
Mercury (Hg)			107.0		%		80-120	06-SEP-18
WG2868779-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-SEP-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4204498								
WG2868779-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			91.5		%		70-130	06-SEP-18
Arsenic (As)			101.3		%		70-130	06-SEP-18
Barium (Ba)			98.5		%		70-130	06-SEP-18
Beryllium (Be)			98.9		%		70-130	06-SEP-18
Boron (B)			3.3		mg/kg		0-8.2	06-SEP-18
Cadmium (Cd)			104.1		%		70-130	06-SEP-18
Chromium (Cr)			102.1		%		70-130	06-SEP-18
Cobalt (Co)			100.9		%		70-130	06-SEP-18
Copper (Cu)			101.4		%		70-130	06-SEP-18
Lead (Pb)			91.8		%		70-130	06-SEP-18
Molybdenum (Mo)			97.8		%		70-130	06-SEP-18
Nickel (Ni)			101.6		%		70-130	06-SEP-18
Selenium (Se)			0.29		mg/kg		0.11-0.51	06-SEP-18
Silver (Ag)			0.23		mg/kg		0.13-0.33	06-SEP-18
Thallium (Tl)			0.118		mg/kg		0.077-0.18	06-SEP-18
Uranium (U)			93.5		%		70-130	06-SEP-18
Vanadium (V)			102.5		%		70-130	06-SEP-18
Zinc (Zn)			97.3		%		70-130	06-SEP-18
WG2868779-6 DUP		**WG2868779-5**						
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	06-SEP-18
Arsenic (As)		1.8	3.4	J	ug/g	1.6	2	06-SEP-18
Barium (Ba)		38.0	41.5		ug/g	8.7	40	06-SEP-18
Beryllium (Be)		0.21	0.23		ug/g	5.5	30	06-SEP-18
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	06-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4204498								
WG2868779-6 DUP		**WG2868779-5**						
Cadmium (Cd)		0.047	0.053		ug/g	12	30	06-SEP-18
Chromium (Cr)		21.7	24.7		ug/g	13	30	06-SEP-18
Cobalt (Co)		5.03	5.75		ug/g	13	30	06-SEP-18
Copper (Cu)		8.58	10.0		ug/g	15	30	06-SEP-18
Lead (Pb)		3.41	3.85		ug/g	12	40	06-SEP-18
Molybdenum (Mo)		0.80	0.76		ug/g	4.7	40	06-SEP-18
Nickel (Ni)		7.91	8.61		ug/g	8.5	30	06-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	06-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	06-SEP-18
Thallium (Tl)		<0.050	<0.050	RPD-NA	ug/g	N/A	30	06-SEP-18
Uranium (U)		0.390	0.460		ug/g	17	30	06-SEP-18
Vanadium (V)		46.1	51.3		ug/g	11	30	06-SEP-18
Zinc (Zn)		29.6	32.5		ug/g	9.6	30	06-SEP-18
WG2868779-4 LCS								
Antimony (Sb)			100.4		%		80-120	06-SEP-18
Arsenic (As)			104.6		%		80-120	06-SEP-18
Barium (Ba)			108.6		%		80-120	06-SEP-18
Beryllium (Be)			103.5		%		80-120	06-SEP-18
Boron (B)			90.1		%		80-120	06-SEP-18
Cadmium (Cd)			110.7		%		80-120	06-SEP-18
Chromium (Cr)			108.4		%		80-120	06-SEP-18
Cobalt (Co)			107.7		%		80-120	06-SEP-18
Copper (Cu)			108.0		%		80-120	06-SEP-18
Lead (Pb)			107.2		%		80-120	06-SEP-18
Molybdenum (Mo)			98.3		%		80-120	06-SEP-18
Nickel (Ni)			108.4		%		80-120	06-SEP-18
Selenium (Se)			100.8		%		80-120	06-SEP-18
Silver (Ag)			106.0		%		80-120	06-SEP-18
Thallium (Tl)			106.5		%		80-120	06-SEP-18
Uranium (U)			103.9		%		80-120	06-SEP-18
Vanadium (V)			112.2		%		80-120	06-SEP-18
Zinc (Zn)			102.7		%		80-120	06-SEP-18
WG2868779-1 MB								
							0.1	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4204498								
WG2868779-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	06-SEP-18
Arsenic (As)			<1.0		mg/kg		1	06-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	06-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	06-SEP-18
Boron (B)			<5.0		mg/kg		5	06-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	06-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	06-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	06-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	06-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	06-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	06-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	06-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	06-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	06-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	06-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	06-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	06-SEP-18
Batch R4207714								
WG2870109-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			104.0		%		70-130	10-SEP-18
Arsenic (As)			122.7		%		70-130	10-SEP-18
Barium (Ba)			121.5		%		70-130	10-SEP-18
Beryllium (Be)			111.5		%		70-130	10-SEP-18
Boron (B)			3.6		mg/kg		0-8.2	10-SEP-18
Cadmium (Cd)			118.2		%		70-130	10-SEP-18
Chromium (Cr)			120.7		%		70-130	10-SEP-18
Cobalt (Co)			116.1		%		70-130	10-SEP-18
Copper (Cu)			121.6		%		70-130	10-SEP-18
Lead (Pb)			110.6		%		70-130	10-SEP-18
Molybdenum (Mo)			118.1		%		70-130	10-SEP-18
Nickel (Ni)			119.8		%		70-130	10-SEP-18
Selenium (Se)			0.37		mg/kg		0.11-0.51	10-SEP-18
Silver (Ag)			0.27		mg/kg		0.13-0.33	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4207714								
WG2870109-2 CRM		**WT-CANMET-TILL1**						
Thallium (Tl)			0.127		mg/kg		0.077-0.18	10-SEP-18
Uranium (U)			110.6		%		70-130	10-SEP-18
Vanadium (V)			119.1		%		70-130	10-SEP-18
Zinc (Zn)			116.4		%		70-130	10-SEP-18
WG2870109-4 DUP		**L2156982-11**						
Antimony (Sb)		12.1	14.9		ug/g	21	30	07-SEP-18
Arsenic (As)		9.5	11.0		ug/g	15	30	07-SEP-18
Barium (Ba)		103	127		ug/g	21	40	07-SEP-18
Beryllium (Be)		<0.50	0.56	RPD-NA	ug/g	N/A	30	07-SEP-18
Boron (B)		9.5	11.0		ug/g	14	30	07-SEP-18
Cadmium (Cd)		1.23	1.45		ug/g	17	30	07-SEP-18
Chromium (Cr)		23.1	21.5		ug/g	7.2	30	07-SEP-18
Cobalt (Co)		7.5	8.9		ug/g	16	30	07-SEP-18
Copper (Cu)		446	545		ug/g	20	30	07-SEP-18
Lead (Pb)		727	935		ug/g	25	40	07-SEP-18
Molybdenum (Mo)		<1.0	1.0	RPD-NA	ug/g	N/A	40	07-SEP-18
Nickel (Ni)		31.0	31.2		ug/g	0.8	30	07-SEP-18
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	07-SEP-18
Silver (Ag)		0.54	0.62		ug/g	13	40	07-SEP-18
Thallium (Tl)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	07-SEP-18
Uranium (U)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	07-SEP-18
Vanadium (V)		25.5	29.5		ug/g	14	30	07-SEP-18
Zinc (Zn)		427	491		ug/g	14	30	07-SEP-18
WG2870109-3 LCS								
Antimony (Sb)			119.8		%		80-120	10-SEP-18
Arsenic (As)			109.9		%		80-120	10-SEP-18
Barium (Ba)			108.4		%		80-120	10-SEP-18
Beryllium (Be)			105.2		%		80-120	10-SEP-18
Boron (B)			100.7		%		80-120	10-SEP-18
Cadmium (Cd)			108.3		%		80-120	10-SEP-18
Chromium (Cr)			109.3		%		80-120	10-SEP-18
Cobalt (Co)			104.5		%		80-120	10-SEP-18
Copper (Cu)			107.8		%		80-120	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4207714								
WG2870109-3 LCS								
Lead (Pb)			101.9		%		80-120	10-SEP-18
Molybdenum (Mo)			107.7		%		80-120	10-SEP-18
Nickel (Ni)			106.9		%		80-120	10-SEP-18
Selenium (Se)			114.8		%		80-120	10-SEP-18
Silver (Ag)			104.0		%		80-120	10-SEP-18
Thallium (Tl)			99.8		%		80-120	10-SEP-18
Uranium (U)			100.8		%		80-120	10-SEP-18
Vanadium (V)			111.2		%		80-120	10-SEP-18
Zinc (Zn)			101.6		%		80-120	10-SEP-18
WG2870109-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	07-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	07-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	07-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	07-SEP-18
Boron (B)			<5.0		mg/kg		5	07-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	07-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	07-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	07-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	07-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	07-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	07-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	07-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	07-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	07-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	07-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	07-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	07-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	07-SEP-18
MOISTURE-WT	**Soil**							
Batch R4203526								
WG2868436-3 DUP		**L2157443-1**						
% Moisture		16.8	16.7		%	0.7	20	06-SEP-18
WG2868436-2 LCS								
% Moisture			100.0		%		90-110	06-SEP-18

Quality Control Report

Workorder: L2156982 Report Date: 10-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R4203526								
WG2868436-1 MB								
% Moisture			<0.10		%		0.1	06-SEP-18
Batch R4203535								
WG2868348-3 DUP		**L2158228-1**						
% Moisture		11.6	13.5		%	15	20	06-SEP-18
WG2868348-2 LCS								
% Moisture			99.96		%		90-110	06-SEP-18
WG2868348-1 MB								
% Moisture			<0.10		%		0.1	06-SEP-18
Batch R4204492								
WG2868163-3 DUP		**L2156594-1**						
% Moisture		7.19	7.66		%	6.3	20	06-SEP-18
WG2868163-2 LCS								
% Moisture			100.0		%		90-110	06-SEP-18
WG2868163-1 MB								
% Moisture			<0.10		%		0.1	06-SEP-18
PAH-511-WT	**Soil**							
Batch R4203560								
WG2867356-12 DUP		**WG2867356-11**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Benzo(a)anthracene		0.108	0.084		ug/g	25	40	07-SEP-18
Benzo(a)pyrene		0.105	0.084		ug/g	23	40	07-SEP-18
Benzo(b)fluoranthene		0.149	0.103		ug/g	36	40	07-SEP-18
Benzo(g,h,i)perylene		0.052	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Benzo(k)fluoranthene		0.064	0.050		ug/g	25	40	07-SEP-18
Chrysene		0.108	0.086		ug/g	22	40	07-SEP-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Fluoranthene		0.215	0.173		ug/g	22	40	07-SEP-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Indeno(1,2,3-cd)pyrene		0.057	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4203560								
WG2867356-12 DUP		**WG2867356-11**						
Phenanthrene		0.097	0.079		ug/g	20	40	07-SEP-18
Pyrene		0.184	0.150		ug/g	20	40	07-SEP-18
WG2867356-2 LCS								
1-Methylnaphthalene			92.0		%		50-140	06-SEP-18
2-Methylnaphthalene			92.5		%		50-140	06-SEP-18
Acenaphthene			93.2		%		50-140	06-SEP-18
Acenaphthylene			89.3		%		50-140	06-SEP-18
Anthracene			86.0		%		50-140	06-SEP-18
Benzo(a)anthracene			87.3		%		50-140	06-SEP-18
Benzo(a)pyrene			89.1		%		50-140	06-SEP-18
Benzo(b)fluoranthene			91.0		%		50-140	06-SEP-18
Benzo(g,h,i)perylene			70.4		%		50-140	06-SEP-18
Benzo(k)fluoranthene			92.7		%		50-140	06-SEP-18
Chrysene			84.8		%		50-140	06-SEP-18
Dibenzo(ah)anthracene			73.5		%		50-140	06-SEP-18
Fluoranthene			85.1		%		50-140	06-SEP-18
Fluorene			92.5		%		50-140	06-SEP-18
Indeno(1,2,3-cd)pyrene			70.0		%		50-140	06-SEP-18
Naphthalene			90.0		%		50-140	06-SEP-18
Phenanthrene			91.3		%		50-140	06-SEP-18
Pyrene			85.0		%		50-140	06-SEP-18
WG2867356-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	06-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	06-SEP-18
Acenaphthene			<0.050		ug/g		0.05	06-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	06-SEP-18
Anthracene			<0.050		ug/g		0.05	06-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	06-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	06-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	06-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	06-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	06-SEP-18
Chrysene			<0.050		ug/g		0.05	06-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	06-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4203560								
WG2867356-1 MB								
Fluoranthene			<0.050		ug/g		0.05	06-SEP-18
Fluorene			<0.050		ug/g		0.05	06-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	06-SEP-18
Naphthalene			<0.013		ug/g		0.013	06-SEP-18
Phenanthrene			<0.046		ug/g		0.046	06-SEP-18
Pyrene			<0.050		ug/g		0.05	06-SEP-18
Surrogate: 2-Fluorobiphenyl			90.0		%		50-140	06-SEP-18
Surrogate: p-Terphenyl d14			87.2		%		50-140	06-SEP-18
WG2867356-13 MS		**WG2867356-11**						
1-Methylnaphthalene			98.2		%		50-140	07-SEP-18
2-Methylnaphthalene			97.7		%		50-140	07-SEP-18
Acenaphthene			94.1		%		50-140	07-SEP-18
Acenaphthylene			89.4		%		50-140	07-SEP-18
Anthracene			87.5		%		50-140	07-SEP-18
Benzo(a)anthracene			87.5		%		50-140	07-SEP-18
Benzo(a)pyrene			81.6		%		50-140	07-SEP-18
Benzo(b)fluoranthene			82.4		%		50-140	07-SEP-18
Benzo(g,h,i)perylene			63.5		%		50-140	07-SEP-18
Benzo(k)fluoranthene			95.2		%		50-140	07-SEP-18
Chrysene			82.1		%		50-140	07-SEP-18
Dibenzo(ah)anthracene			70.0		%		50-140	07-SEP-18
Fluoranthene			89.7		%		50-140	07-SEP-18
Fluorene			88.2		%		50-140	07-SEP-18
Indeno(1,2,3-cd)pyrene			68.6		%		50-140	07-SEP-18
Naphthalene			91.7		%		50-140	07-SEP-18
Phenanthrene			88.3		%		50-140	07-SEP-18
Pyrene			87.7		%		50-140	07-SEP-18
PH-WT	**Soil**							
Batch R4203993								
WG2867737-1 DUP		**L2156412-2**						
pH		8.06	7.98	J	pH units	0.08	0.3	06-SEP-18
WG2868007-1 LCS								
pH			7.03		pH units		6.9-7.1	06-SEP-18
SAR-R511-WT	**Soil**							

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R4204509								
WG2868972-4 DUP		**WG2868972-3**						
Calcium (Ca)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	06-SEP-18
Sodium (Na)		9.1	9.6		mg/L	4.8	30	06-SEP-18
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	06-SEP-18
WG2868972-2 IRM		**WT SAR2**						
Calcium (Ca)			94.8		%		70-130	06-SEP-18
Sodium (Na)			101.7		%		70-130	06-SEP-18
Magnesium (Mg)			90.9		%		70-130	06-SEP-18
WG2868972-1 MB								
Calcium (Ca)			<1.0		mg/L		1	06-SEP-18
Sodium (Na)			<1.0		mg/L		1	06-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	06-SEP-18
Batch R4204511								
WG2868818-4 DUP		**WG2868818-3**						
Calcium (Ca)		5.0	5.0		mg/L	0.5	30	06-SEP-18
Sodium (Na)		8.4	8.4		mg/L	0.2	30	06-SEP-18
Magnesium (Mg)		1.2	1.2		mg/L	0.9	30	06-SEP-18
WG2868818-2 IRM		**WT SAR2**						
Calcium (Ca)			108.8		%		70-130	06-SEP-18
Sodium (Na)			108.4		%		70-130	06-SEP-18
Magnesium (Mg)			101.4		%		70-130	06-SEP-18
WG2868818-1 MB								
Calcium (Ca)			<1.0		mg/L		1	06-SEP-18
Sodium (Na)			<1.0		mg/L		1	06-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	06-SEP-18
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-4 DUP		**WG2866828-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-4 DUP		**WG2866828-3**						
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
Benzene		0.0269	0.0273		ug/g	1.2	40	05-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Ethylbenzene		0.049	0.048		ug/g	2.0	40	05-SEP-18
n-Hexane		0.173	0.172		ug/g	0.4	40	05-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
m+p-Xylenes		0.165	0.163		ug/g	1.2	40	05-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
o-Xylene		0.056	0.055		ug/g	1.8	40	05-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Toluene		0.395	0.392		ug/g	0.8	40	05-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	05-SEP-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Vinyl chloride		<0.020	<0.020		ug/g			05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-4 DUP		**WG2866828-3**						
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	05-SEP-18
WG2866828-2 LCS								
1,1,1,2-Tetrachloroethane			101.4		%		60-130	05-SEP-18
1,1,2,2-Tetrachloroethane			98.9		%		60-130	05-SEP-18
1,1,1-Trichloroethane			109.8		%		60-130	05-SEP-18
1,1,2-Trichloroethane			101.8		%		60-130	05-SEP-18
1,1-Dichloroethane			111.0		%		60-130	05-SEP-18
1,1-Dichloroethylene			103.8		%		60-130	05-SEP-18
1,2-Dibromoethane			98.3		%		70-130	05-SEP-18
1,2-Dichlorobenzene			107.7		%		70-130	05-SEP-18
1,2-Dichloroethane			108.7		%		60-130	05-SEP-18
1,2-Dichloropropane			108.1		%		70-130	05-SEP-18
1,3-Dichlorobenzene			109.9		%		70-130	05-SEP-18
1,4-Dichlorobenzene			109.0		%		70-130	05-SEP-18
Acetone			111.4		%		60-140	05-SEP-18
Benzene			108.8		%		70-130	05-SEP-18
Bromodichloromethane			108.6		%		50-140	05-SEP-18
Bromoform			91.9		%		70-130	05-SEP-18
Bromomethane			83.8		%		50-140	05-SEP-18
Carbon tetrachloride			109.3		%		70-130	05-SEP-18
Chlorobenzene			107.6		%		70-130	05-SEP-18
Chloroform			110.7		%		70-130	05-SEP-18
cis-1,2-Dichloroethylene			106.1		%		70-130	05-SEP-18
cis-1,3-Dichloropropene			109.3		%		70-130	05-SEP-18
Dibromochloromethane			99.3		%		60-130	05-SEP-18
Dichlorodifluoromethane			90.4		%		50-140	05-SEP-18
Ethylbenzene			107.9		%		70-130	05-SEP-18
n-Hexane			101.5		%		70-130	05-SEP-18
Methylene Chloride			105.9		%		70-130	05-SEP-18
MTBE			109.8		%		70-130	05-SEP-18
m+p-Xylenes			109.0		%		70-130	05-SEP-18
Methyl Ethyl Ketone			97.8		%		60-140	05-SEP-18
Methyl Isobutyl Ketone			98.2		%		60-140	05-SEP-18
o-Xylene			105.0		%		70-130	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-2 LCS								
Styrene			99.7		%		70-130	05-SEP-18
Tetrachloroethylene			107.5		%		60-130	05-SEP-18
Toluene			108.3		%		70-130	05-SEP-18
trans-1,2-Dichloroethylene			109.1		%		60-130	05-SEP-18
trans-1,3-Dichloropropene			104.0		%		70-130	05-SEP-18
Trichloroethylene			110.8		%		60-130	05-SEP-18
Trichlorofluoromethane			116.1		%		50-140	05-SEP-18
Vinyl chloride			98.8		%		60-140	05-SEP-18
WG2866828-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1-Dichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	05-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
Acetone			<0.50		ug/g		0.5	05-SEP-18
Benzene			<0.0068		ug/g		0.0068	05-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	05-SEP-18
Bromoform			<0.050		ug/g		0.05	05-SEP-18
Bromomethane			<0.050		ug/g		0.05	05-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	05-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	05-SEP-18
Chloroform			<0.050		ug/g		0.05	05-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	05-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	05-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	05-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-1 MB								
n-Hexane			<0.050		ug/g		0.05	05-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	05-SEP-18
MTBE			<0.050		ug/g		0.05	05-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	05-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	05-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	05-SEP-18
o-Xylene			<0.020		ug/g		0.02	05-SEP-18
Styrene			<0.050		ug/g		0.05	05-SEP-18
Tetrachloroethylene			<0.050		ug/g		0.05	05-SEP-18
Toluene			<0.080		ug/g		0.08	05-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	05-SEP-18
Trichloroethylene			<0.010		ug/g		0.01	05-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	05-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	05-SEP-18
Surrogate: 1,4-Difluorobenzene			112.2		%		50-140	05-SEP-18
Surrogate: 4-Bromofluorobenzene			103.4		%		50-140	05-SEP-18
WG2866828-5 MS		**L2156968-1**						
1,1,1,2-Tetrachloroethane			109.7		%		50-140	05-SEP-18
1,1,2,2-Tetrachloroethane			104.9		%		50-140	05-SEP-18
1,1,1-Trichloroethane			119.0		%		50-140	05-SEP-18
1,1,2-Trichloroethane			107.9		%		50-140	05-SEP-18
1,1-Dichloroethane			118.3		%		50-140	05-SEP-18
1,1-Dichloroethylene			110.1		%		50-140	05-SEP-18
1,2-Dibromoethane			103.4		%		50-140	05-SEP-18
1,2-Dichlorobenzene			114.3		%		50-140	05-SEP-18
1,2-Dichloroethane			110.0		%		50-140	05-SEP-18
1,2-Dichloropropane			113.8		%		50-140	05-SEP-18
1,3-Dichlorobenzene			113.8		%		50-140	05-SEP-18
1,4-Dichlorobenzene			112.3		%		50-140	05-SEP-18
Acetone			118.6		%		50-140	05-SEP-18
Benzene			115.3		%		50-140	05-SEP-18
Bromodichloromethane			113.5		%		50-140	05-SEP-18
Bromoform			97.7		%		50-140	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4201927								
WG2866828-5 MS		**L2156968-1**						
Bromomethane			87.1		%		50-140	05-SEP-18
Carbon tetrachloride			118.4		%		50-140	05-SEP-18
Chlorobenzene			114.4		%		50-140	05-SEP-18
Chloroform			118.0		%		50-140	05-SEP-18
cis-1,2-Dichloroethylene			113.0		%		50-140	05-SEP-18
cis-1,3-Dichloropropene			105.9		%		50-140	05-SEP-18
Dibromochloromethane			105.5		%		50-140	05-SEP-18
Dichlorodifluoromethane			93.0		%		50-140	05-SEP-18
Ethylbenzene			113.4		%		50-140	05-SEP-18
n-Hexane			103.5		%		50-140	05-SEP-18
Methylene Chloride			111.2		%		50-140	05-SEP-18
MTBE			116.8		%		50-140	05-SEP-18
m+p-Xylenes			112.7		%		50-140	05-SEP-18
Methyl Ethyl Ketone			101.8		%		50-140	05-SEP-18
Methyl Isobutyl Ketone			97.4		%		50-140	05-SEP-18
o-Xylene			110.0		%		50-140	05-SEP-18
Styrene			100.7		%		50-140	05-SEP-18
Tetrachloroethylene			114.2		%		50-140	05-SEP-18
Toluene			106.5		%		50-140	05-SEP-18
trans-1,2-Dichloroethylene			111.1		%		50-140	05-SEP-18
trans-1,3-Dichloropropene			100.3		%		50-140	05-SEP-18
Trichloroethylene			117.7		%		50-140	05-SEP-18
Trichlorofluoromethane			126.0		%		50-140	05-SEP-18
Vinyl chloride			103.4		%		50-140	05-SEP-18
Batch R4202490								
WG2866812-4 DUP		**WG2866812-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4202490								
WG2866812-4 DUP		**WG2866812-3**						
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	05-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	05-SEP-18
n-Hexane		0.101	0.103		ug/g	2.3	40	05-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	05-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	05-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	05-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	05-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	05-SEP-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	05-SEP-18
Vinyl chloride		<0.020	<0.020		ug/g			05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4202490								
WG2866812-4 DUP		**WG2866812-3**						
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	05-SEP-18
WG2866812-2 LCS								
1,1,1,2-Tetrachloroethane			97.9		%		60-130	05-SEP-18
1,1,2,2-Tetrachloroethane			98.6		%		60-130	05-SEP-18
1,1,1-Trichloroethane			103.4		%		60-130	05-SEP-18
1,1,2-Trichloroethane			98.1		%		60-130	05-SEP-18
1,1-Dichloroethane			104.6		%		60-130	05-SEP-18
1,1-Dichloroethylene			97.4		%		60-130	05-SEP-18
1,2-Dibromoethane			95.2		%		70-130	05-SEP-18
1,2-Dichlorobenzene			104.0		%		70-130	05-SEP-18
1,2-Dichloroethane			102.7		%		60-130	05-SEP-18
1,2-Dichloropropane			103.1		%		70-130	05-SEP-18
1,3-Dichlorobenzene			106.5		%		70-130	05-SEP-18
1,4-Dichlorobenzene			104.6		%		70-130	05-SEP-18
Acetone			103.5		%		60-140	05-SEP-18
Benzene			103.3		%		70-130	05-SEP-18
Bromodichloromethane			103.4		%		50-140	05-SEP-18
Bromoform			91.4		%		70-130	05-SEP-18
Bromomethane			79.1		%		50-140	05-SEP-18
Carbon tetrachloride			103.0		%		70-130	05-SEP-18
Chlorobenzene			104.1		%		70-130	05-SEP-18
Chloroform			104.7		%		70-130	05-SEP-18
cis-1,2-Dichloroethylene			101.3		%		70-130	05-SEP-18
cis-1,3-Dichloropropene			106.9		%		70-130	05-SEP-18
Dibromochloromethane			96.6		%		60-130	05-SEP-18
Dichlorodifluoromethane			81.7		%		50-140	05-SEP-18
Ethylbenzene			104.5		%		70-130	05-SEP-18
n-Hexane			121.9		%		70-130	05-SEP-18
Methylene Chloride			100.3		%		70-130	05-SEP-18
MTBE			105.0		%		70-130	05-SEP-18
m+p-Xylenes			105.6		%		70-130	05-SEP-18
Methyl Ethyl Ketone			94.6		%		60-140	05-SEP-18
Methyl Isobutyl Ketone			96.7		%		60-140	05-SEP-18
o-Xylene			101.8		%		70-130	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4202490								
WG2866812-2 LCS								
Styrene			97.9		%		70-130	05-SEP-18
Tetrachloroethylene			104.8		%		60-130	05-SEP-18
Toluene			104.4		%		70-130	05-SEP-18
trans-1,2-Dichloroethylene			103.8		%		60-130	05-SEP-18
trans-1,3-Dichloropropene			103.3		%		70-130	05-SEP-18
Trichloroethylene			105.8		%		60-130	05-SEP-18
Trichlorofluoromethane			107.3		%		50-140	05-SEP-18
Vinyl chloride			92.5		%		60-140	05-SEP-18
WG2866812-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1-Dichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	05-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	05-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	05-SEP-18
Acetone			<0.50		ug/g		0.5	05-SEP-18
Benzene			<0.0068		ug/g		0.0068	05-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	05-SEP-18
Bromoform			<0.050		ug/g		0.05	05-SEP-18
Bromomethane			<0.050		ug/g		0.05	05-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	05-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	05-SEP-18
Chloroform			<0.050		ug/g		0.05	05-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	05-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	05-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	05-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4202490								
WG2866812-1 MB								
n-Hexane			<0.050		ug/g		0.05	05-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	05-SEP-18
MTBE			<0.050		ug/g		0.05	05-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	05-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	05-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	05-SEP-18
o-Xylene			<0.020		ug/g		0.02	05-SEP-18
Styrene			<0.050		ug/g		0.05	05-SEP-18
Tetrachloroethylene			<0.050		ug/g		0.05	05-SEP-18
Toluene			<0.080		ug/g		0.08	05-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	05-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	05-SEP-18
Trichloroethylene			<0.010		ug/g		0.01	05-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	05-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	05-SEP-18
Surrogate: 1,4-Difluorobenzene			102.1		%		50-140	05-SEP-18
Surrogate: 4-Bromofluorobenzene			95.3		%		50-140	05-SEP-18
WG2866812-5 MS		**L2156561-1**						
1,1,1,2-Tetrachloroethane			101.5		%		50-140	05-SEP-18
1,1,2,2-Tetrachloroethane			99.4		%		50-140	05-SEP-18
1,1,1-Trichloroethane			109.0		%		50-140	05-SEP-18
1,1,2-Trichloroethane			100.7		%		50-140	05-SEP-18
1,1-Dichloroethane			109.7		%		50-140	05-SEP-18
1,1-Dichloroethylene			103.7		%		50-140	05-SEP-18
1,2-Dibromoethane			97.4		%		50-140	05-SEP-18
1,2-Dichlorobenzene			109.1		%		50-140	05-SEP-18
1,2-Dichloroethane			106.2		%		50-140	05-SEP-18
1,2-Dichloropropane			107.0		%		50-140	05-SEP-18
1,3-Dichlorobenzene			111.8		%		50-140	05-SEP-18
1,4-Dichlorobenzene			110.8		%		50-140	05-SEP-18
Acetone			107.1		%		50-140	05-SEP-18
Benzene			108.2		%		50-140	05-SEP-18
Bromodichloromethane			107.4		%		50-140	05-SEP-18
Bromoform			92.2		%		50-140	05-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4202490								
WG2866812-5 MS		**L2156561-1**						
Bromomethane			82.2		%		50-140	05-SEP-18
Carbon tetrachloride			108.7		%		50-140	05-SEP-18
Chlorobenzene			108.0		%		50-140	05-SEP-18
Chloroform			109.4		%		50-140	05-SEP-18
cis-1,2-Dichloroethylene			105.6		%		50-140	05-SEP-18
cis-1,3-Dichloropropene			107.0		%		50-140	05-SEP-18
Dibromochloromethane			98.8		%		50-140	05-SEP-18
Dichlorodifluoromethane			93.4		%		50-140	05-SEP-18
Ethylbenzene			109.4		%		50-140	05-SEP-18
n-Hexane			133.0		%		50-140	05-SEP-18
Methylene Chloride			104.9		%		50-140	05-SEP-18
MTBE			109.6		%		50-140	05-SEP-18
m+p-Xylenes			110.2		%		50-140	05-SEP-18
Methyl Ethyl Ketone			103.5		%		50-140	05-SEP-18
Methyl Isobutyl Ketone			96.5		%		50-140	05-SEP-18
o-Xylene			106.0		%		50-140	05-SEP-18
Styrene			101.2		%		50-140	05-SEP-18
Tetrachloroethylene			109.5		%		50-140	05-SEP-18
Toluene			109.8		%		50-140	05-SEP-18
trans-1,2-Dichloroethylene			109.3		%		50-140	05-SEP-18
trans-1,3-Dichloropropene			102.6		%		50-140	05-SEP-18
Trichloroethylene			111.1		%		50-140	05-SEP-18
Trichlorofluoromethane			115.6		%		50-140	05-SEP-18
Vinyl chloride			99.3		%		50-140	05-SEP-18

Quality Control Report

Workorder: L2156982 Report Date: 10-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
E	Matrix Spike recovery outside ALS DQO due to heterogeneous analyte background in sample.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

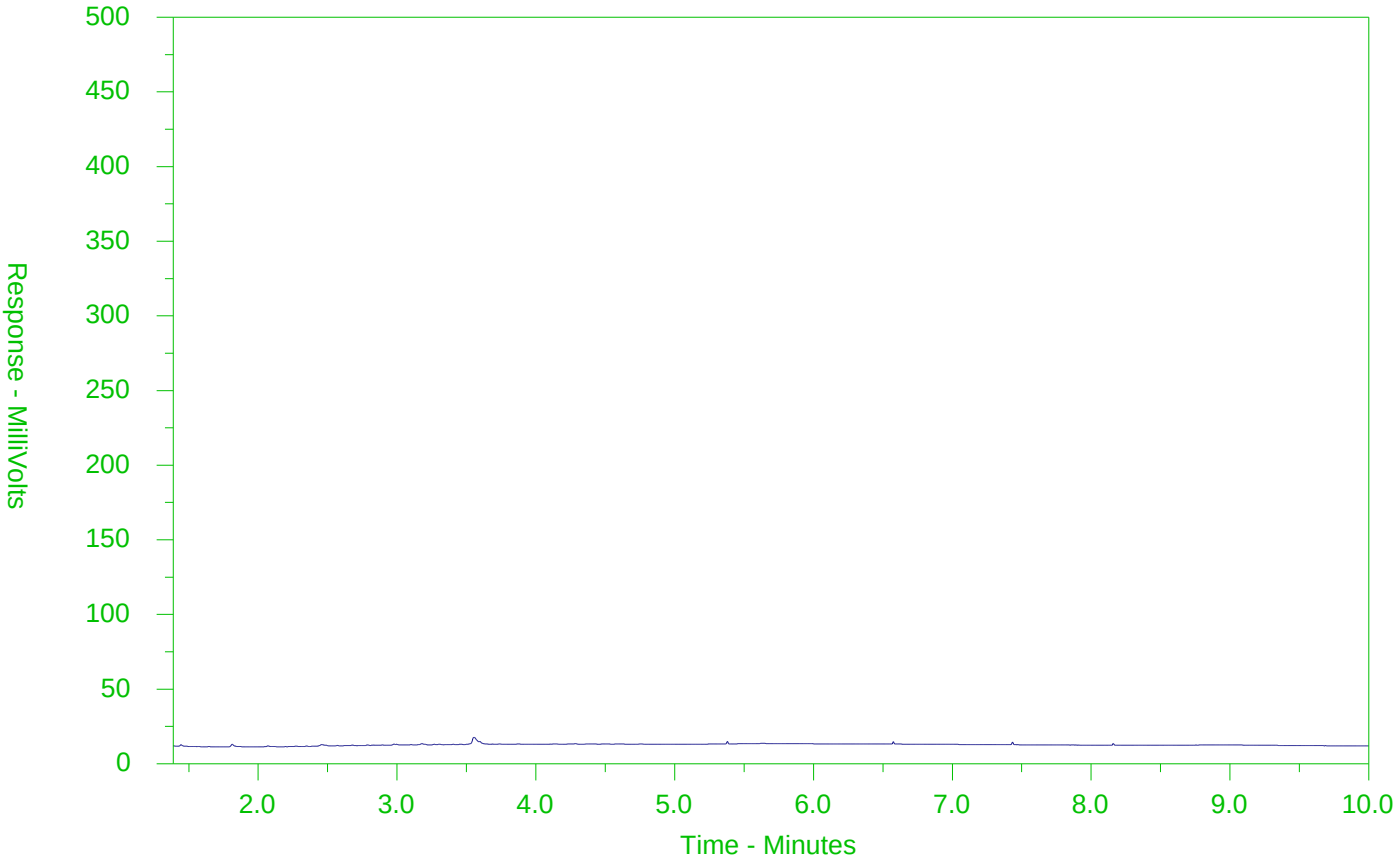
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2156982-3
Client Sample ID: BH18-01-8



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

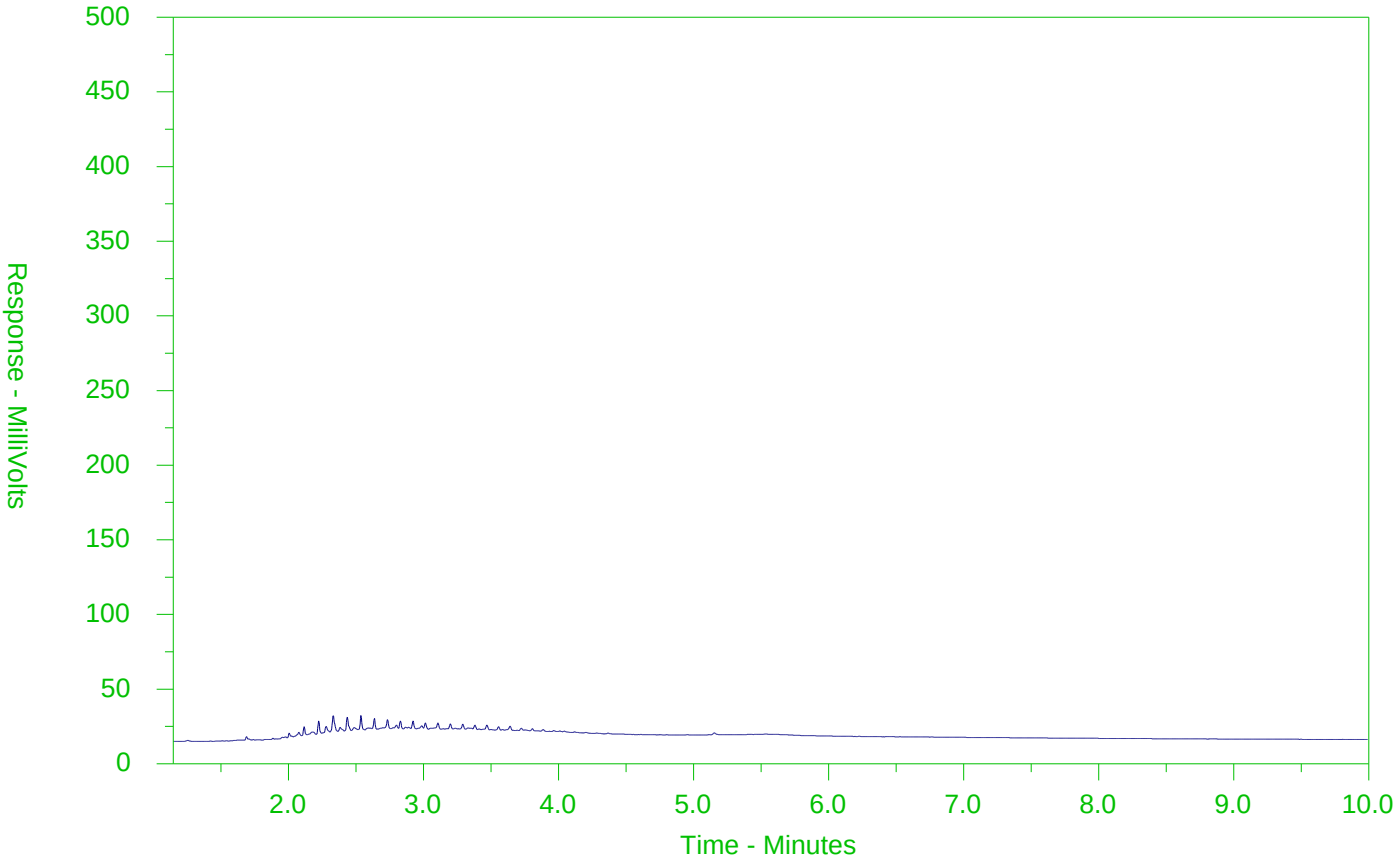
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2156982-6
Client Sample ID: BH18-01-16



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

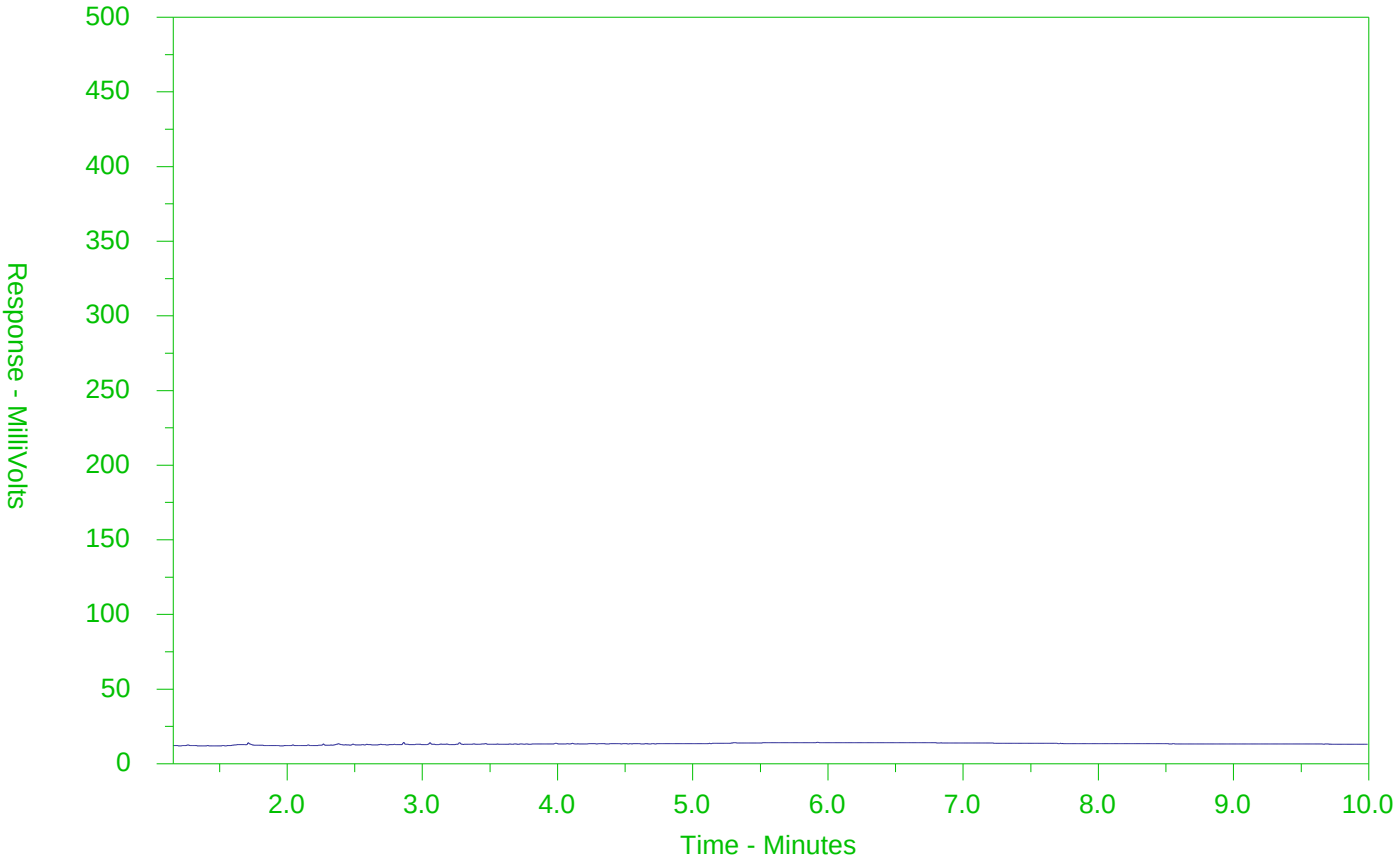
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2156982-12
Client Sample ID: BH18-02-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

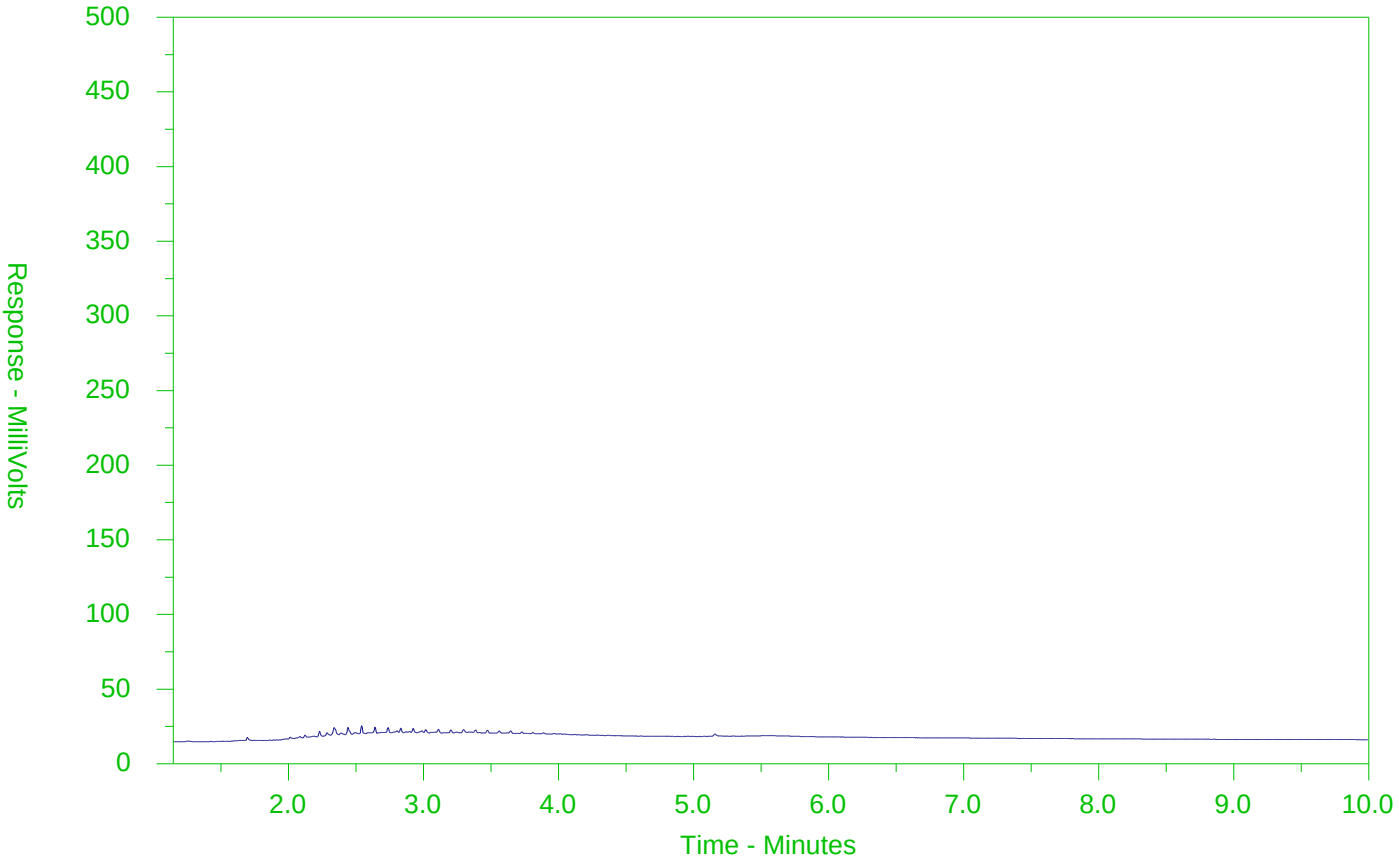
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2156982-15
Client Sample ID: BH18-02-9/10



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2156982-COFC

COC Number: 14 - 469158

Page 1 of 1

Report To		Report Format / Distribution		Turnaround Time (TAT) (Rush Turnaround Time (TAT) is not available for all tests)	
Company:	SNC-Lavalin Inc.	Select Report Format:	PDF EXCEL EDD (DIGITAL)	R	Regular (Standard TAT if received by 3pm)
Contact:	Leon Burger	Quality Control (QC) Report with Report	Yes No	P	Priority (2-4 business days if received by 3pm)
Address:	1005 Skyview Drive Burlington ON	Criteria on Report - provide details below if box checked		E	Emergency (1-2 business days if received by 3pm)
		Select Distribution:	EMAIL MAIL FAX	E2	Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	416-635-5882 x 52514	Email 1 or Fax	leon.burger@snclavalin.com	Specify Date Required for E2,E or P:	
		Email 2			

Invoice To		Invoice Distribution	
	Same as Report To: Yes No	Select Invoice Distribution:	EMAIL MAIL FAX
	Copy of Invoice with Report: Yes No		
Company:		Email 1 or Fax	
Contact:	payables@snclavalin.com	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	655184	GL Account:	Routing Code:
PO / AFE:	11522	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2156982 AP 3K

ALS Contact: MM

Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals + Inorganics	ICP Metals + Hg	PAH	BTEX	PHC F1-F4	VOCs	Number of Containers
1	BH18-01-2	29-Aug-18	10:05	Soil	X						1
2	BH18-01-6	29-Aug-18	10:30	Soil						X	3
3	BH18-01-8	29-Aug-18	10:45	Soil			X	X	X	X	4
4	BH18-01-9	29-Aug-18	11:00	Soil		X					1
5	BH18-01-9	29-Aug-18	11:00	Soil				H	H	→ ON HOLD	3
6	BH18-01-16	29-Aug-18	12:30	Soil			X	X	X	X	4
7	BH18-01 [illegible]-5 ecw	29-Aug-18	10:20	Soil			H	H	H	H → ON HOLD	3
8	BH18-01-7A	29-Aug-18	10:34	Soil			[illegible]	H	H	H → ON HOLD	3
9	BH18-01-10	29-Aug-18	11:15	Soil			[illegible]	H	H	H → ON HOLD	3
10	BH18-01-3	29-Aug-18	14:45 pm	Soil				H	H	H → ON HOLD	3
11	BH18-02-2	29-Aug-18	15:20	Soil	X						1
12	BH18-02-5	29-Aug-18	15:40	Soil			X	X	X		3

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? Yes No	Table 3 + Table 5 O.Reg 153
Are samples for human drinking water use? Yes No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen		SIF Observations	Yes No
Ice packs	Yes X No	Custody seal intact	Yes No
Cooling Initiated	X		

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		4.0	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received:	Date: AUG 30 2018	Time: 6:00 pm
Caitlin Rodlon	2018/08/29	17:00						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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NA-FM-0326e v09 Front004 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

AUG 30 2018

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2156982-COFC

COC Number: 14 - 469159

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)	
Company:	SNC-Lavalin Inc.	Select Report Format:	PDF ☒ EXCEL ☐ EDD (DIGITAL)	R ☐	Regular (Standard TAT if received by 3pm)
Contact:	Leon Burger	Quality Control (QC) Report with Report	☒ Yes ☐ No	P ☐	Priority (2-4 business days if received by 3pm)
Address:	1005 Skyview Drive Burlington, ON	☐ Criteria on Report - provide details below if box checked		E ☐	Emergency (1-2 business days if received by 3pm)
Phone:	416-635-5882 x52514	Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX	E2 ☐	Same day or weekend emergency if received by 10am – contact ALS for surcharge.
		Email 1 or Fax	leon.burger@snclavalin.com	Specify Date Required for E2,E or P:	
		Email 2			

Invoice To	Same as Report To ☐ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report ☒ Yes ☐ No	Select Invoice Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	payables@snc-lavalin.com
Contact:	payables@sncdavalin.com	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	605184	GL Account:	Routing Code:
PO / AFE:	11522	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals ICP + Hg	VOC	BTEX / F1	PHC	PAH								Number of Containers
13	BH18-02-6	29-Aug-18	16:00	Soil	X												1
14	BH18-02-9	↓	↓	↓		X	X			use jar for moisture							2
15	BH18-02-9/10							X									1
16	BH18-02-12								X								1
17	BH18-02-4					H	H	H	H	- ON HOLD							3
18	BH18-02-12					H	H			- ON HOLD							2

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	Table 3 - Table 5 O.Reg. 153
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☒	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☒				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			4.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Caitlin Radich	Aug/29/18	17:00					Aug 30/18	6:00 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-032ee v08 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 31-AUG-18
Report Date: 11-SEP-18 13:29 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2157466

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 14-469163
Legal Site Desc:

Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ANALYTICAL REPORT

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157466-1	BH18-04-1/2	Metals	Lead (Pb)	427	120	ug/g
L2157466-2	BH18-04-6	Polycyclic Aromatic Hydrocarbons	Benzo(a)anthracene	1.14	0.96	ug/g
			Benzo(a)pyrene	1.23	0.3	ug/g
			Benzo(b)fluoranthene	1.23	0.96	ug/g
			Dibenzo(ah)anthracene	0.199	0.1	ug/g
L2157466-3	BH18-04-7	Polycyclic Aromatic Hydrocarbons	Acenaphthylene	0.239	0.15	ug/g
			Benzo(a)anthracene	1.36	0.96	ug/g
			Benzo(a)pyrene	1.35	0.3	ug/g
			Benzo(b)fluoranthene	1.29	0.96	ug/g
			Benzo(k)fluoranthene	1.10	0.96	ug/g
			Dibenzo(ah)anthracene	0.245	0.1	ug/g
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157466-3	BH18-04-7	Polycyclic Aromatic Hydrocarbons	Acenaphthylene	0.239	0.15	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

				Lab ID	L2157466-1	L2157466-2	L2157466-3	L2157466-5	L2157466-6	L2157466-7	L2157466-9	L2157466-10
				Sample Date	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18
				Sample ID	BH18-04-1/2	BH18-04-6	BH18-04-7	BH18-05-2	BH18-05-5	BH18-05-55	BH18-08-8	BH18-08-7
		Guide Limits										
Analyte	Unit	#1	#2									
Conductivity	mS/cm	1.4	-		0.307			0.0792				
% Moisture	%	-	-		24.5	33.2	34.4	6.02	18.3	17.1	20.0	19.0
pH	pH units	-	-		7.58			7.84				

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - SOIL

		Guide Limits			
Lab ID				L2157466-1	L2157466-5
Sample Date				30-AUG-18	30-AUG-18
Sample ID				BH18-04-1/2	BH18-05-2
Analyte	**Unit**	**#1**	**#2**		
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

		Guide Limits			
Lab ID				L2157466-1	L2157466-5
Sample Date				30-AUG-18	30-AUG-18
Sample ID				BH18-04-1/2	BH18-05-2
Analyte	**Unit**	**#1**	**#2**		
SAR	SAR	12	-	0.13	<0.27 SAR:DL
Calcium (Ca)	mg/L	-	-	18.3	1.0
Magnesium (Mg)	mg/L	-	-	2.8	<1.0
Sodium (Na)	mg/L	-	-	2.3	<1.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2157466-1 / Sample Date: 30-AUG-18 / Sample ID: BH18-04-1/2	Lab ID: L2157466-3 / Sample Date: 30-AUG-18 / Sample ID: BH18-04-7	Lab ID: L2157466-5 / Sample Date: 30-AUG-18 / Sample ID: BH18-05-2	Lab ID: L2157466-8 / Sample Date: 30-AUG-18 / Sample ID: BH18-05-04
Antimony (Sb)	ug/g	40	63	4.2	<1.0	<1.0	<1.0
Arsenic (As)	ug/g	18	47	12.6	<1.0	<1.0	<1.0
Barium (Ba)	ug/g	670	7700	135	1.8	1.4	1.4
Beryllium (Be)	ug/g	8	60	0.54	<0.50	<0.50	<0.50
Boron (B)	ug/g	120	5000	14.6	5.8	6.3	<5.0
Boron (B), Hot Water Ext.	ug/g	2	5000	0.44		<0.10	
Cadmium (Cd)	ug/g	1.9	7.9	0.79	<0.50	<0.50	<0.50
Chromium (Cr)	ug/g	160	11000	18.5	<1.0	<1.0	<1.0
Cobalt (Co)	ug/g	80	2500	9.6	<1.0	<1.0	<1.0
Copper (Cu)	ug/g	230	5600	215	3.0	1.3	1.0
Lead (Pb)	ug/g	120	1000	427	1.8	<1.0	<1.0
Mercury (Hg)	ug/g	3.9	13	0.932 DLHC	0.124	0.0189	0.0052
Molybdenum (Mo)	ug/g	40	1200	1.3	<1.0	<1.0	<1.0
Nickel (Ni)	ug/g	270	510	19.6	<1.0	<1.0	<1.0
Selenium (Se)	ug/g	5.5	1200	1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	40	490	0.30	<0.20	<0.20	<0.20
Thallium (Tl)	ug/g	3.3	33	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	300	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	160	30.6	<1.0	<1.0	<1.0
Zinc (Zn)	ug/g	340	15000	255	<5.0	<5.0	<5.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

		Guide Limits			
				Lab ID	L2157466-1	L2157466-5
				Sample Date	30-AUG-18	30-AUG-18
				Sample ID	BH18-04-1/2	BH18-05-2
Analyte	**Unit**	**#1**	**#2**		
Chromium, Hexavalent	ug/g	8	40	<0.20	<0.20

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

				Lab ID	L2157466-2	L2157466-3	L2157466-6	L2157466-7	L2157466-10
				Sample Date	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18
				Sample ID	BH18-04-6	BH18-04-7	BH18-05-5	BH18-05-55	BH18-08-7
		Guide Limits							
Analyte	Unit	#1	#2						
Acetone	ug/g	16	16	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	ug/g	0.32	6.1	0.0181	0.0210	<0.0068	<0.0068	<0.0068
Bromodichloromethane	ug/g	18	50	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	ug/g	0.61	2	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon tetrachloride	ug/g	0.21	0.43	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	ug/g	2.4	2.4	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	ug/g	13	48	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	ug/g	0.47	0.85	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dibromoethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	ug/g	6.8	60	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	ug/g	9.6	59	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	ug/g	0.2	0.39	<0.050	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane	ug/g	16	16	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	ug/g	17	120	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	ug/g	0.05	0.055	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	ug/g	0.064	0.12	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	ug/g	55	110	<0.050	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	ug/g	1.3	2.9	<0.050	<0.050	<0.050	<0.050	<0.050
Methylene Chloride	ug/g	1.6	3	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	ug/g	0.16	0.33	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.18	0.4	<0.042	<0.042	<0.042	<0.042	<0.042
Ethylbenzene	ug/g	9.5	17	<0.018	<0.018	<0.018	<0.018	<0.018
n-Hexane	ug/g	46	54	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	ug/g	70	150	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	ug/g	31	64	<0.50	<0.50	<0.50	<0.50	<0.50
MTBE	ug/g	11	14	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	ug/g	34	66	<0.050	<0.050	<0.050	<0.050	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

			Lab ID	L2157466-2	L2157466-3	L2157466-6	L2157466-7	L2157466-10
			Sample Date	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18
			Sample ID	BH18-04-6	BH18-04-7	BH18-05-5	BH18-05-55	BH18-08-7
		Guide Limits						
Analyte	Unit	#1	#2					
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.24	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	ug/g	4.5	9.5	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	ug/g	68	68	<0.080	<0.080	<0.080	<0.080	<0.080
1,1,1-Trichloroethane	ug/g	6.1	9.8	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	ug/g	0.05	0.068	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	ug/g	0.91	1.8	<0.010	<0.010	<0.010	<0.010	0.011
Trichlorofluoromethane	ug/g	4	4	<0.050	<0.050	<0.050	<0.050	<0.050
Vinyl chloride	ug/g	0.032	0.057	<0.020	<0.020	<0.020	<0.020	<0.020
o-Xylene	ug/g	-	-	<0.020	<0.020	<0.020	<0.020	<0.020
m+p-Xylenes	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030
Xylenes (Total)	ug/g	26	26	<0.050	<0.050	<0.050	<0.050	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	85.6	91.6	88.7	95.7	96.4
Surrogate: 1,4-Difluorobenzene	%	-	-	95.9	100.1	97.4	105.4	105.9

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Hydrocarbons - SOIL

		Guide Limits						
Lab ID				L2157466-2	L2157466-3	L2157466-6	L2157466-7	L2157466-10
Sample Date				30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18
Sample ID				BH18-04-6	BH18-04-7	BH18-05-5	BH18-05-55	BH18-08-7
Analyte	**Unit**	**#1**	**#2**					
F1 (C6-C10)	ug/g	55	55	<5.0	<5.0	<5.0	<5.0	<5.0
F1-BTEX	ug/g	55	55	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16)	ug/g	230	230	<10	<10	<10	<10	<10
F2-Naphth	ug/g	-	-	<10	<10	<10	<10	
F3 (C16-C34)	ug/g	1700	5800	103	122	<50	<50	<50
F3-PAH	ug/g	-	-	94	109	<50	<50	
F4 (C34-C50)	ug/g	3300	6900	<50	<50	<50	<50	<50
Total Hydrocarbons (C6-C50)	ug/g	-	-	103	122	<72	<72	<72
Chrom. to baseline at nC50		-	-	YES	YES	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	95.7	89.5	93.8	95.2	93.8
Surrogate: 3,4-Dichlorotoluene	%	-	-	82.9	92.3	97.2	100.7	102.7

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

		Guide Limits						
Lab ID				L2157466-2	L2157466-3	L2157466-6	L2157466-7	L2157466-9
Sample Date				30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18	30-AUG-18
Sample ID				BH18-04-6	BH18-04-7	BH18-05-5	BH18-05-55	BH18-08-8
Analyte	**Unit**	**#1**	**#2**					
Acenaphthene	ug/g	96	330	<0.050	0.052	<0.050	<0.050	<0.050
Acenaphthylene	ug/g	0.15	0.15	0.120	0.239	<0.050	<0.050	<0.050
Anthracene	ug/g	0.67	0.67	0.158	0.323	<0.050	<0.050	<0.050
Benzo(a)anthracene	ug/g	0.96	36	1.14	1.36	<0.050	<0.050	<0.050
Benzo(a)pyrene	ug/g	0.3	3.6	1.23	1.35	<0.050	<0.050	<0.050
Benzo(b)fluoranthene	ug/g	0.96	36	1.23	1.29	<0.050	<0.050	<0.050
Benzo(g,h,i)perylene	ug/g	9.6	360	0.648	0.823	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	ug/g	0.96	36	0.943	1.10	<0.050	<0.050	<0.050
Chrysene	ug/g	9.6	360	1.11	1.34	<0.050	<0.050	<0.050
Dibenzo(ah)anthracene	ug/g	0.1	3.6	0.199	0.245	<0.050	<0.050	<0.050
Fluoranthene	ug/g	9.6	360	1.68	2.55	<0.050	<0.050	<0.050
Fluorene	ug/g	62	62	0.052	0.112	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	ug/g	0.76	36	0.673	0.754	<0.050	<0.050	<0.050
1+2-Methylnaphthalenes	ug/g	76	76	<0.042	0.128	<0.042	<0.042	<0.042
1-Methylnaphthalene	ug/g	76	76	<0.030	0.054	<0.030	<0.030	<0.030
2-Methylnaphthalene	ug/g	76	76	0.041	0.074	<0.030	<0.030	<0.030
Naphthalene	ug/g	9.6	200	0.103	0.173	<0.013	<0.013	<0.013
Phenanthrene	ug/g	12	270	0.526	1.11	<0.046	<0.046	<0.046
Pyrene	ug/g	96	2600	1.55	2.31	<0.050	<0.050	<0.050
Surrogate: 2-Fluorobiphenyl	%	-	-	88.8	85.7	87.5	88.2	87.8
Surrogate: p-Terphenyl d14	%	-	-	101.4	99.5	100.2	101.4	97.8

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polychlorinated Biphenyls - SOIL

			Lab ID	L2157466-2	L2157466-5
			Sample Date	30-AUG-18	30-AUG-18
			Sample ID	BH18-04-6	BH18-05-2
Analyte	**Unit**	**Guide Limits #1**	**#2**		
Aroclor 1242	ug/g	-	-	<0.010	<0.010
Aroclor 1248	ug/g	-	-	<0.010	<0.010
Aroclor 1254	ug/g	-	-	<0.010	<0.010
Aroclor 1260	ug/g	-	-	<0.010	<0.010
Total PCBs	ug/g	1.1	4.1	<0.020	<0.020
Surrogate: d14-Terphenyl	%	-	-	87.8	84.3

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
SAR:DL	SAR is incalculable due to undetectable Na. Detection Limit represents maximum possible SAR value.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PCB-511-WT	Soil	PCB-O.Reg 153/04 (July 2011)	SW846 3510/8082

An aliquot of a solid sample is extracted with a solvent, extract is cleaned up and analyzed on the GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

14-469163

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2157466 Report Date: 11-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4208610								
WG2870839-4 DUP		**L2157128-34**						
Boron (B), Hot Water Ext.		<0.10	<0.10	RPD-NA	ug/g	N/A	30	10-SEP-18
WG2870839-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			73.3		%		70-130	10-SEP-18
WG2870839-3 LCS								
Boron (B), Hot Water Ext.			98.5		%		70-130	10-SEP-18
WG2870839-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	10-SEP-18
Batch R4208628								
WG2871923-4 DUP		**L2157831-4**						
Boron (B), Hot Water Ext.		0.13	0.12		ug/g	4.3	30	10-SEP-18
WG2871923-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			78.6		%		70-130	10-SEP-18
WG2871923-3 LCS								
Boron (B), Hot Water Ext.			95.6		%		70-130	10-SEP-18
WG2871923-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	10-SEP-18
CN-WAD-R511-WT	**Soil**							
Batch R4207717								
WG2870073-7 DUP		**L2157466-5**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	10-SEP-18
WG2870073-6 LCS								
Cyanide, Weak Acid Diss			94.7		%		80-120	10-SEP-18
WG2870073-5 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	10-SEP-18
WG2870073-8 MS		**L2157466-5**						
Cyanide, Weak Acid Diss			98.2		%		70-130	10-SEP-18
CR-CR6-IC-WT	**Soil**							
Batch R4206534								
WG2870090-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			91.0		%		70-130	10-SEP-18
WG2870090-3 DUP		**L2157395-3**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	10-SEP-18
WG2870090-2 LCS								
Chromium, Hexavalent			98.0		%		80-120	10-SEP-18
WG2870090-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	**Soil**							
Batch R4207488								
WG2870878-4 DUP		**WG2870878-3**						
Conductivity		2.07	2.04		mS/cm	1.5	20	10-SEP-18
WG2870878-2 IRM		**WT SAR2**						
Conductivity			90.7		%		70-130	10-SEP-18
WG2871967-1 LCS								
Conductivity			99.4		%		90-110	10-SEP-18
WG2870878-1 MB								
Conductivity			<0.0040		mS/cm		0.004	10-SEP-18
Batch R4207549								
WG2871920-4 DUP		**WG2871920-3**						
Conductivity		1.27	1.27		mS/cm	0.6	20	10-SEP-18
WG2871920-2 IRM		**WT SAR2**						
Conductivity			89.8		%		70-130	10-SEP-18
WG2871963-1 LCS								
Conductivity			100.5		%		90-110	10-SEP-18
WG2871920-1 MB								
Conductivity			<0.0040		mS/cm		0.004	10-SEP-18
F1-HS-511-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	10-SEP-18
WG2867573-2 LCS								
F1 (C6-C10)			95.4		%		80-120	10-SEP-18
WG2867573-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	10-SEP-18
Surrogate: 3,4-Dichlorotoluene			99.0		%		60-140	10-SEP-18
WG2867573-6 MS		**L2157464-11**						
F1 (C6-C10)			73.4		%		60-140	10-SEP-18
F2-F4-511-WT	**Soil**							
Batch R4204899								
WG2868951-3 DUP		**WG2868951-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	07-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
WG2868951-2 LCS								
F2 (C10-C16)			103.5		%		80-120	07-SEP-18
F3 (C16-C34)			102.9		%		80-120	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4204899								
WG2868951-2 LCS								
F4 (C34-C50)			109.1		%		80-120	07-SEP-18
WG2868951-1 MB								
F2 (C10-C16)			<10		ug/g		10	07-SEP-18
F3 (C16-C34)			<50		ug/g		50	07-SEP-18
F4 (C34-C50)			<50		ug/g		50	07-SEP-18
Surrogate: 2-Bromobenzotrifluoride			95.7		%		60-140	07-SEP-18
WG2868951-4 MS		**WG2868951-5**						
F2 (C10-C16)			102.6		%		60-140	07-SEP-18
F3 (C16-C34)			101.3		%		60-140	07-SEP-18
F4 (C34-C50)			106.6		%		60-140	07-SEP-18
HG-200.2-CVAA-WT	**Soil**							
Batch R4206587								
WG2870601-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			96.6		%		70-130	10-SEP-18
WG2870601-6 DUP		**WG2870601-5**						
Mercury (Hg)		0.0114	0.0117		ug/g	2.4	40	10-SEP-18
WG2870601-3 LCS								
Mercury (Hg)			103.0		%		80-120	10-SEP-18
WG2870601-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	10-SEP-18
Batch R4207089								
WG2871910-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			105.2		%		70-130	10-SEP-18
WG2871910-6 DUP		**WG2871910-5**						
Mercury (Hg)		0.0254	0.0248		ug/g	2.6	40	10-SEP-18
WG2871910-3 LCS								
Mercury (Hg)			115.0		%		80-120	10-SEP-18
WG2871910-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	10-SEP-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4206032								
WG2870601-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			97.9		%		70-130	09-SEP-18
Arsenic (As)			95.8		%		70-130	09-SEP-18
Barium (Ba)			91.4		%		70-130	09-SEP-18
Beryllium (Be)			85.5		%		70-130	09-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4206032								
WG2870601-2 CRM		**WT-CANMET-TILL1**						
Boron (B)			2.3		mg/kg		0-8.2	09-SEP-18
Cadmium (Cd)			98.1		%		70-130	09-SEP-18
Chromium (Cr)			91.6		%		70-130	09-SEP-18
Cobalt (Co)			95.0		%		70-130	09-SEP-18
Copper (Cu)			98.3		%		70-130	09-SEP-18
Lead (Pb)			96.0		%		70-130	09-SEP-18
Molybdenum (Mo)			96.6		%		70-130	09-SEP-18
Nickel (Ni)			95.4		%		70-130	09-SEP-18
Selenium (Se)			0.31		mg/kg		0.11-0.51	09-SEP-18
Silver (Ag)			0.23		mg/kg		0.13-0.33	09-SEP-18
Thallium (Tl)			0.115		mg/kg		0.077-0.18	09-SEP-18
Uranium (U)			89.4		%		70-130	09-SEP-18
Vanadium (V)			92.5		%		70-130	09-SEP-18
Zinc (Zn)			93.0		%		70-130	09-SEP-18
WG2870601-6 DUP		**WG2870601-5**						
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	09-SEP-18
Arsenic (As)		2.44	2.40		ug/g	1.7	30	09-SEP-18
Barium (Ba)		103	100		ug/g	2.3	40	09-SEP-18
Beryllium (Be)		0.51	0.50		ug/g	2.3	30	09-SEP-18
Boron (B)		8.5	9.0		ug/g	5.3	30	09-SEP-18
Cadmium (Cd)		0.072	0.073		ug/g	1.6	30	09-SEP-18
Chromium (Cr)		19.1	19.1		ug/g	0.2	30	09-SEP-18
Cobalt (Co)		7.70	7.73		ug/g	0.4	30	09-SEP-18
Copper (Cu)		14.0	14.1		ug/g	0.5	30	09-SEP-18
Lead (Pb)		6.83	6.93		ug/g	1.4	40	09-SEP-18
Molybdenum (Mo)		0.23	0.24		ug/g	2.1	40	09-SEP-18
Nickel (Ni)		16.0	16.0		ug/g	0.1	30	09-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	09-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	09-SEP-18
Thallium (Tl)		0.127	0.127		ug/g	0.1	30	09-SEP-18
Uranium (U)		0.457	0.491		ug/g	7.1	30	09-SEP-18
Vanadium (V)		28.6	29.1		ug/g	1.6	30	09-SEP-18
Zinc (Zn)		37.8	38.6		ug/g	2.2	30	09-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4206032								
WG2870601-4 LCS								
Antimony (Sb)			98.9		%		80-120	09-SEP-18
Arsenic (As)			97.3		%		80-120	09-SEP-18
Barium (Ba)			100.8		%		80-120	09-SEP-18
Beryllium (Be)			87.4		%		80-120	09-SEP-18
Boron (B)			82.8		%		80-120	09-SEP-18
Cadmium (Cd)			97.7		%		80-120	09-SEP-18
Chromium (Cr)			96.7		%		80-120	09-SEP-18
Cobalt (Co)			95.5		%		80-120	09-SEP-18
Copper (Cu)			96.4		%		80-120	09-SEP-18
Lead (Pb)			99.6		%		80-120	09-SEP-18
Molybdenum (Mo)			96.3		%		80-120	09-SEP-18
Nickel (Ni)			96.0		%		80-120	09-SEP-18
Selenium (Se)			97.9		%		80-120	09-SEP-18
Silver (Ag)			98.9		%		80-120	09-SEP-18
Thallium (Tl)			93.3		%		80-120	09-SEP-18
Uranium (U)			98.4		%		80-120	09-SEP-18
Vanadium (V)			98.7		%		80-120	09-SEP-18
Zinc (Zn)			89.5		%		80-120	09-SEP-18
WG2870601-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	09-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	09-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	09-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	09-SEP-18
Boron (B)			<5.0		mg/kg		5	09-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	09-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	09-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	09-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	09-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	09-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	09-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	09-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	09-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	09-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	09-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4206032								
WG2870601-1 MB								
Uranium (U)			<0.050		mg/kg		0.05	09-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	09-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	09-SEP-18
Batch R4209167								
WG2871910-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			112.6		%		70-130	10-SEP-18
Arsenic (As)			121.6		%		70-130	10-SEP-18
Barium (Ba)			120.2		%		70-130	10-SEP-18
Beryllium (Be)			109.3		%		70-130	10-SEP-18
Boron (B)			3.1		mg/kg		0-8.2	10-SEP-18
Cadmium (Cd)			117.0		%		70-130	10-SEP-18
Chromium (Cr)			112.0		%		70-130	10-SEP-18
Cobalt (Co)			110.8		%		70-130	10-SEP-18
Copper (Cu)			117.5		%		70-130	10-SEP-18
Lead (Pb)			108.8		%		70-130	10-SEP-18
Molybdenum (Mo)			111.9		%		70-130	10-SEP-18
Nickel (Ni)			114.6		%		70-130	10-SEP-18
Selenium (Se)			0.38		mg/kg		0.11-0.51	10-SEP-18
Silver (Ag)			0.26		mg/kg		0.13-0.33	10-SEP-18
Thallium (Tl)			0.125		mg/kg		0.077-0.18	10-SEP-18
Uranium (U)			102.4		%		70-130	10-SEP-18
Vanadium (V)			113.0		%		70-130	10-SEP-18
Zinc (Zn)			110.1		%		70-130	10-SEP-18
WG2871910-6 DUP		**WG2871910-5**						
Antimony (Sb)		0.18	0.19		ug/g	2.9	30	10-SEP-18
Arsenic (As)		6.34	6.45		ug/g	1.6	30	10-SEP-18
Barium (Ba)		133	145		ug/g	8.5	40	10-SEP-18
Beryllium (Be)		0.85	0.92		ug/g	7.4	30	10-SEP-18
Boron (B)		8.8	9.6		ug/g	9.0	30	10-SEP-18
Cadmium (Cd)		0.288	0.242		ug/g	17	30	10-SEP-18
Chromium (Cr)		29.5	31.2		ug/g	5.7	30	10-SEP-18
Cobalt (Co)		12.8	13.2		ug/g	3.6	30	10-SEP-18
Copper (Cu)		31.2	31.9		ug/g	2.4	30	10-SEP-18
Lead (Pb)		24.7	26.0		ug/g	5.2	40	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4209167								
WG2871910-6 DUP		**WG2871910-5**						
Molybdenum (Mo)		0.61	0.70		ug/g	14	40	10-SEP-18
Nickel (Ni)		30.8	31.3		ug/g	1.8	30	10-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	10-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	10-SEP-18
Thallium (Tl)		0.177	0.194		ug/g	8.9	30	10-SEP-18
Uranium (U)		0.648	0.673		ug/g	3.8	30	10-SEP-18
Vanadium (V)		42.0	43.5		ug/g	3.5	30	10-SEP-18
Zinc (Zn)		120	111		ug/g	7.7	30	10-SEP-18
WG2871910-4 LCS								
Antimony (Sb)			105.4		%		80-120	10-SEP-18
Arsenic (As)			116.9		%		80-120	10-SEP-18
Barium (Ba)			113.8		%		80-120	10-SEP-18
Beryllium (Be)			98.0		%		80-120	10-SEP-18
Boron (B)			97.9		%		80-120	10-SEP-18
Cadmium (Cd)			119.4		%		80-120	10-SEP-18
Chromium (Cr)			113.9		%		80-120	10-SEP-18
Cobalt (Co)			109.2		%		80-120	10-SEP-18
Copper (Cu)			113.2		%		80-120	10-SEP-18
Lead (Pb)			107.3		%		80-120	10-SEP-18
Molybdenum (Mo)			102.4		%		80-120	10-SEP-18
Nickel (Ni)			111.9		%		80-120	10-SEP-18
Selenium (Se)			119.3		%		80-120	10-SEP-18
Silver (Ag)			117.8		%		80-120	10-SEP-18
Thallium (Tl)			109.7		%		80-120	10-SEP-18
Uranium (U)			117.6		%		80-120	10-SEP-18
Vanadium (V)			117.8		%		80-120	10-SEP-18
Zinc (Zn)			106.8		%		80-120	10-SEP-18
WG2871910-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	10-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	10-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	10-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	10-SEP-18
Boron (B)			<5.0		mg/kg		5	10-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4209167								
WG2871910-1 MB								
Chromium (Cr)			<0.50		mg/kg		0.5	10-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	10-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	10-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	10-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	10-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	10-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	10-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	10-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	10-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	10-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	10-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	10-SEP-18
MOISTURE-WT	**Soil**							
Batch R4204529								
WG2870124-3 DUP		**L2157464-1**						
% Moisture		3.27	3.31		%	1.1	20	08-SEP-18
WG2870124-2 LCS								
% Moisture			99.3		%		90-110	08-SEP-18
WG2870124-1 MB								
% Moisture			<0.10		%		0.1	08-SEP-18
Batch R4204530								
WG2870144-3 DUP		**L2157471-5**						
% Moisture		19.3	20.0		%	3.9	20	08-SEP-18
WG2870144-2 LCS								
% Moisture			100.1		%		90-110	08-SEP-18
WG2870144-1 MB								
% Moisture			<0.10		%		0.1	08-SEP-18
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-3 DUP		**WG2868979-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	10-SEP-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	10-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-3 DUP		**WG2868979-5**						
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	10-SEP-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	10-SEP-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
WG2868979-2 LCS								
1-Methylnaphthalene			93.8		%		50-140	10-SEP-18
2-Methylnaphthalene			92.8		%		50-140	10-SEP-18
Acenaphthene			92.6		%		50-140	10-SEP-18
Acenaphthylene			86.8		%		50-140	10-SEP-18
Anthracene			87.8		%		50-140	10-SEP-18
Benzo(a)anthracene			85.9		%		50-140	10-SEP-18
Benzo(a)pyrene			88.4		%		50-140	10-SEP-18
Benzo(b)fluoranthene			89.2		%		50-140	10-SEP-18
Benzo(g,h,i)perylene			71.5		%		50-140	10-SEP-18
Benzo(k)fluoranthene			98.6		%		50-140	10-SEP-18
Chrysene			91.1		%		50-140	10-SEP-18
Dibenzo(ah)anthracene			74.8		%		50-140	10-SEP-18
Fluoranthene			96.5		%		50-140	10-SEP-18
Fluorene			87.1		%		50-140	10-SEP-18
Indeno(1,2,3-cd)pyrene			60.3		%		50-140	10-SEP-18
Naphthalene			91.5		%		50-140	10-SEP-18
Phenanthrene			90.6		%		50-140	10-SEP-18
Pyrene			98.5		%		50-140	10-SEP-18
WG2868979-1 MB								
							0.03	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	10-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	10-SEP-18
Acenaphthene			<0.050		ug/g		0.05	10-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	10-SEP-18
Anthracene			<0.050		ug/g		0.05	10-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	10-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	10-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	10-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Chrysene			<0.050		ug/g		0.05	10-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	10-SEP-18
Fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Fluorene			<0.050		ug/g		0.05	10-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	10-SEP-18
Naphthalene			<0.013		ug/g		0.013	10-SEP-18
Phenanthrene			<0.046		ug/g		0.046	10-SEP-18
Pyrene			<0.050		ug/g		0.05	10-SEP-18
Surrogate: 2-Fluorobiphenyl			88.4		%		50-140	10-SEP-18
Surrogate: p-Terphenyl d14			98.8		%		50-140	10-SEP-18
WG2868979-4 MS		**WG2868979-5**						
1-Methylnaphthalene			92.9		%		50-140	10-SEP-18
2-Methylnaphthalene			93.1		%		50-140	10-SEP-18
Acenaphthene			91.1		%		50-140	10-SEP-18
Acenaphthylene			86.1		%		50-140	10-SEP-18
Anthracene			89.9		%		50-140	10-SEP-18
Benzo(a)anthracene			86.9		%		50-140	10-SEP-18
Benzo(a)pyrene			87.7		%		50-140	10-SEP-18
Benzo(b)fluoranthene			92.9		%		50-140	10-SEP-18
Benzo(g,h,i)perylene			60.3		%		50-140	10-SEP-18
Benzo(k)fluoranthene			98.5		%		50-140	10-SEP-18
Chrysene			89.1		%		50-140	10-SEP-18
Dibenzo(ah)anthracene			65.7		%		50-140	10-SEP-18
Fluoranthene			95.1		%		50-140	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-4 MS		**WG2868979-5**						
Fluorene			86.3		%		50-140	10-SEP-18
Indeno(1,2,3-cd)pyrene			55.4		%		50-140	10-SEP-18
Naphthalene			91.8		%		50-140	10-SEP-18
Phenanthrene			90.0		%		50-140	10-SEP-18
Pyrene			97.4		%		50-140	10-SEP-18
PCB-511-WT	**Soil**							
Batch R4207782								
WG2868979-3 DUP		**WG2868979-5**						
Aroclor 1242		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1248		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1254		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1260		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
WG2868979-2 LCS								
Aroclor 1242			96.8		%		60-140	10-SEP-18
Aroclor 1248			93.6		%		60-140	10-SEP-18
Aroclor 1254			98.9		%		60-140	10-SEP-18
Aroclor 1260			106.6		%		60-140	10-SEP-18
WG2868979-1 MB								
Aroclor 1242			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1248			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1254			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1260			<0.010		ug/g		0.01	10-SEP-18
Surrogate: d14-Terphenyl			85.1		%		60-140	10-SEP-18
WG2868979-4 MS		**WG2868979-5**						
Aroclor 1242			91.9		%		60-140	10-SEP-18
Aroclor 1254			89.0		%		60-140	10-SEP-18
Aroclor 1260			98.3		%		60-140	10-SEP-18
Batch R4207879								
WG2870268-3 DUP		**WG2870268-5**						
Aroclor 1242		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1248		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1254		<0.010	<0.010	RPD-NA	ug/g	N/A	40	10-SEP-18
Aroclor 1260		<0.010	0.020	RPD-NA	ug/g	N/A	40	10-SEP-18
WG2870268-2 LCS								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-511-WT	**Soil**							
Batch R4207879								
WG2870268-2 LCS								
Aroclor 1242			94.2		%		60-140	10-SEP-18
Aroclor 1248			85.6		%		60-140	10-SEP-18
Aroclor 1254			92.2		%		60-140	10-SEP-18
Aroclor 1260			97.9		%		60-140	10-SEP-18
WG2870268-1 MB								
Aroclor 1242			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1248			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1254			<0.010		ug/g		0.01	10-SEP-18
Aroclor 1260			<0.010		ug/g		0.01	10-SEP-18
Surrogate: d14-Terphenyl			84.8		%		60-140	10-SEP-18
WG2870268-4 MS		**WG2870268-5**						
Aroclor 1242			97.0		%		60-140	10-SEP-18
Aroclor 1254			97.4		%		60-140	10-SEP-18
Aroclor 1260			101.4		%		60-140	10-SEP-18
PH-WT	**Soil**							
Batch R4204225								
WG2869309-1 DUP		**L2157436-2**						
pH		7.89	7.89	J	pH units	0.00	0.3	06-SEP-18
WG2869777-1 LCS								
pH			6.98		pH units		6.9-7.1	06-SEP-18
SAR-R511-WT	**Soil**							
Batch R4208367								
WG2870878-4 DUP		**WG2870878-3**						
Calcium (Ca)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	10-SEP-18
Sodium (Na)		432	426		mg/L	1.3	30	10-SEP-18
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	10-SEP-18
WG2870878-2 IRM		**WT SAR2**						
Calcium (Ca)			80.0		%		70-130	10-SEP-18
Sodium (Na)			96.8		%		70-130	10-SEP-18
Magnesium (Mg)			78.8		%		70-130	10-SEP-18
WG2870878-1 MB								
Calcium (Ca)			<1.0		mg/L		1	10-SEP-18
Sodium (Na)			<1.0		mg/L		1	10-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	10-SEP-18

Quality Control Report

Workorder: L2157466 Report Date: 11-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R4208567								
WG2871920-4 DUP		**WG2871920-3**						
Calcium (Ca)		35.7	35.2		mg/L	1.3	30	10-SEP-18
Sodium (Na)		163	161		mg/L	1.1	30	10-SEP-18
Magnesium (Mg)		12.3	12.2		mg/L	1.3	30	10-SEP-18
WG2871920-2 IRM		**WT SAR2**						
Calcium (Ca)			79.3		%		70-130	10-SEP-18
Sodium (Na)			96.7		%		70-130	10-SEP-18
Magnesium (Mg)			78.2		%		70-130	10-SEP-18
WG2871920-1 MB								
Calcium (Ca)			<1.0		mg/L		1	10-SEP-18
Sodium (Na)			<1.0		mg/L		1	10-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	10-SEP-18
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	07-SEP-18
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	07-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	07-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	07-SEP-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	07-SEP-18
WG2867573-2 LCS								
1,1,1,2-Tetrachloroethane			100.3		%		60-130	07-SEP-18
1,1,2,2-Tetrachloroethane			104.8		%		60-130	07-SEP-18
1,1,1-Trichloroethane			100.7		%		60-130	07-SEP-18
1,1,2-Trichloroethane			106.3		%		60-130	07-SEP-18
1,1-Dichloroethane			106.7		%		60-130	07-SEP-18
1,1-Dichloroethylene			91.1		%		60-130	07-SEP-18
1,2-Dibromoethane			107.6		%		70-130	07-SEP-18
1,2-Dichlorobenzene			109.2		%		70-130	07-SEP-18
1,2-Dichloroethane			109.8		%		60-130	07-SEP-18
1,2-Dichloropropane			106.5		%		70-130	07-SEP-18
1,3-Dichlorobenzene			108.8		%		70-130	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-2 LCS								
1,4-Dichlorobenzene			110.2		%		70-130	07-SEP-18
Acetone			116.1		%		60-140	07-SEP-18
Benzene			107.6		%		70-130	07-SEP-18
Bromodichloromethane			108.5		%		50-140	07-SEP-18
Bromoform			105.3		%		70-130	07-SEP-18
Bromomethane			83.0		%		50-140	07-SEP-18
Carbon tetrachloride			101.0		%		70-130	07-SEP-18
Chlorobenzene			105.7		%		70-130	07-SEP-18
Chloroform			107.6		%		70-130	07-SEP-18
cis-1,2-Dichloroethylene			104.9		%		70-130	07-SEP-18
cis-1,3-Dichloropropene			111.5		%		70-130	07-SEP-18
Dibromochloromethane			107.3		%		60-130	07-SEP-18
Dichlorodifluoromethane			76.7		%		50-140	07-SEP-18
Ethylbenzene			97.8		%		70-130	07-SEP-18
n-Hexane			113.0		%		70-130	07-SEP-18
Methylene Chloride			108.3		%		70-130	07-SEP-18
MTBE			103.7		%		70-130	07-SEP-18
m+p-Xylenes			102.9		%		70-130	07-SEP-18
Methyl Ethyl Ketone			115.6		%		60-140	07-SEP-18
Methyl Isobutyl Ketone			104.0		%		60-140	07-SEP-18
o-Xylene			96.2		%		70-130	07-SEP-18
Styrene			99.8		%		70-130	07-SEP-18
Tetrachloroethylene			100.2		%		60-130	07-SEP-18
Toluene			97.3		%		70-130	07-SEP-18
trans-1,2-Dichloroethylene			102.0		%		60-130	07-SEP-18
trans-1,3-Dichloropropene			106.6		%		70-130	07-SEP-18
Trichloroethylene			105.9		%		60-130	07-SEP-18
Trichlorofluoromethane			101.4		%		50-140	07-SEP-18
Vinyl chloride			88.5		%		60-140	07-SEP-18
WG2867573-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-1 MB								
1,1-Dichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	07-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
Acetone			<0.50		ug/g		0.5	07-SEP-18
Benzene			<0.0068		ug/g		0.0068	07-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	07-SEP-18
Bromoform			<0.050		ug/g		0.05	07-SEP-18
Bromomethane			<0.050		ug/g		0.05	07-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	07-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	07-SEP-18
Chloroform			<0.050		ug/g		0.05	07-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	07-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	07-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	07-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	07-SEP-18
n-Hexane			<0.050		ug/g		0.05	07-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	07-SEP-18
MTBE			<0.050		ug/g		0.05	07-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	07-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	07-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	07-SEP-18
o-Xylene			<0.020		ug/g		0.02	07-SEP-18
Styrene			<0.050		ug/g		0.05	07-SEP-18
Tetrachloroethylene			<0.050		ug/g		0.05	07-SEP-18
Toluene			<0.080		ug/g		0.08	07-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-1 MB								
Trichloroethylene			<0.010		ug/g		0.01	07-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	07-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	07-SEP-18
Surrogate: 1,4-Difluorobenzene			103.7		%		50-140	07-SEP-18
Surrogate: 4-Bromofluorobenzene			95.8		%		50-140	07-SEP-18
WG2867573-5 MS		**L2157464-10**						
1,1,1,2-Tetrachloroethane			107.2		%		50-140	07-SEP-18
1,1,2,2-Tetrachloroethane			111.3		%		50-140	07-SEP-18
1,1,1-Trichloroethane			108.5		%		50-140	07-SEP-18
1,1,2-Trichloroethane			113.0		%		50-140	07-SEP-18
1,1-Dichloroethane			115.2		%		50-140	07-SEP-18
1,1-Dichloroethylene			99.0		%		50-140	07-SEP-18
1,2-Dibromoethane			113.7		%		50-140	07-SEP-18
1,2-Dichlorobenzene			115.6		%		50-140	07-SEP-18
1,2-Dichloroethane			116.8		%		50-140	07-SEP-18
1,2-Dichloropropane			114.3		%		50-140	07-SEP-18
1,3-Dichlorobenzene			114.8		%		50-140	07-SEP-18
1,4-Dichlorobenzene			116.4		%		50-140	07-SEP-18
Acetone			129.1		%		50-140	07-SEP-18
Benzene			115.8		%		50-140	07-SEP-18
Bromodichloromethane			115.6		%		50-140	07-SEP-18
Bromoform			111.3		%		50-140	07-SEP-18
Bromomethane			88.5		%		50-140	07-SEP-18
Carbon tetrachloride			109.3		%		50-140	07-SEP-18
Chlorobenzene			112.5		%		50-140	07-SEP-18
Chloroform			115.8		%		50-140	07-SEP-18
cis-1,2-Dichloroethylene			112.6		%		50-140	07-SEP-18
cis-1,3-Dichloropropene			118.3		%		50-140	07-SEP-18
Dibromochloromethane			114.2		%		50-140	07-SEP-18
Dichlorodifluoromethane			91.8		%		50-140	07-SEP-18
Ethylbenzene			103.1		%		50-140	07-SEP-18
n-Hexane			125.1		%		50-140	07-SEP-18
Methylene Chloride			117.0		%		50-140	07-SEP-18
MTBE			110.8		%		50-140	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-5 MS		**L2157464-10**						
m+p-Xylenes			109.1		%		50-140	07-SEP-18
Methyl Ethyl Ketone			122.4		%		50-140	07-SEP-18
Methyl Isobutyl Ketone			107.3		%		50-140	07-SEP-18
o-Xylene			101.4		%		50-140	07-SEP-18
Styrene			104.2		%		50-140	07-SEP-18
Tetrachloroethylene			106.7		%		50-140	07-SEP-18
Toluene			102.9		%		50-140	07-SEP-18
trans-1,2-Dichloroethylene			109.9		%		50-140	07-SEP-18
trans-1,3-Dichloropropene			106.3		%		50-140	07-SEP-18
Trichloroethylene			113.8		%		50-140	07-SEP-18
Trichlorofluoromethane			112.2		%		50-140	07-SEP-18
Vinyl chloride			97.4		%		50-140	07-SEP-18

Quality Control Report

Workorder: L2157466 Report Date: 11-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

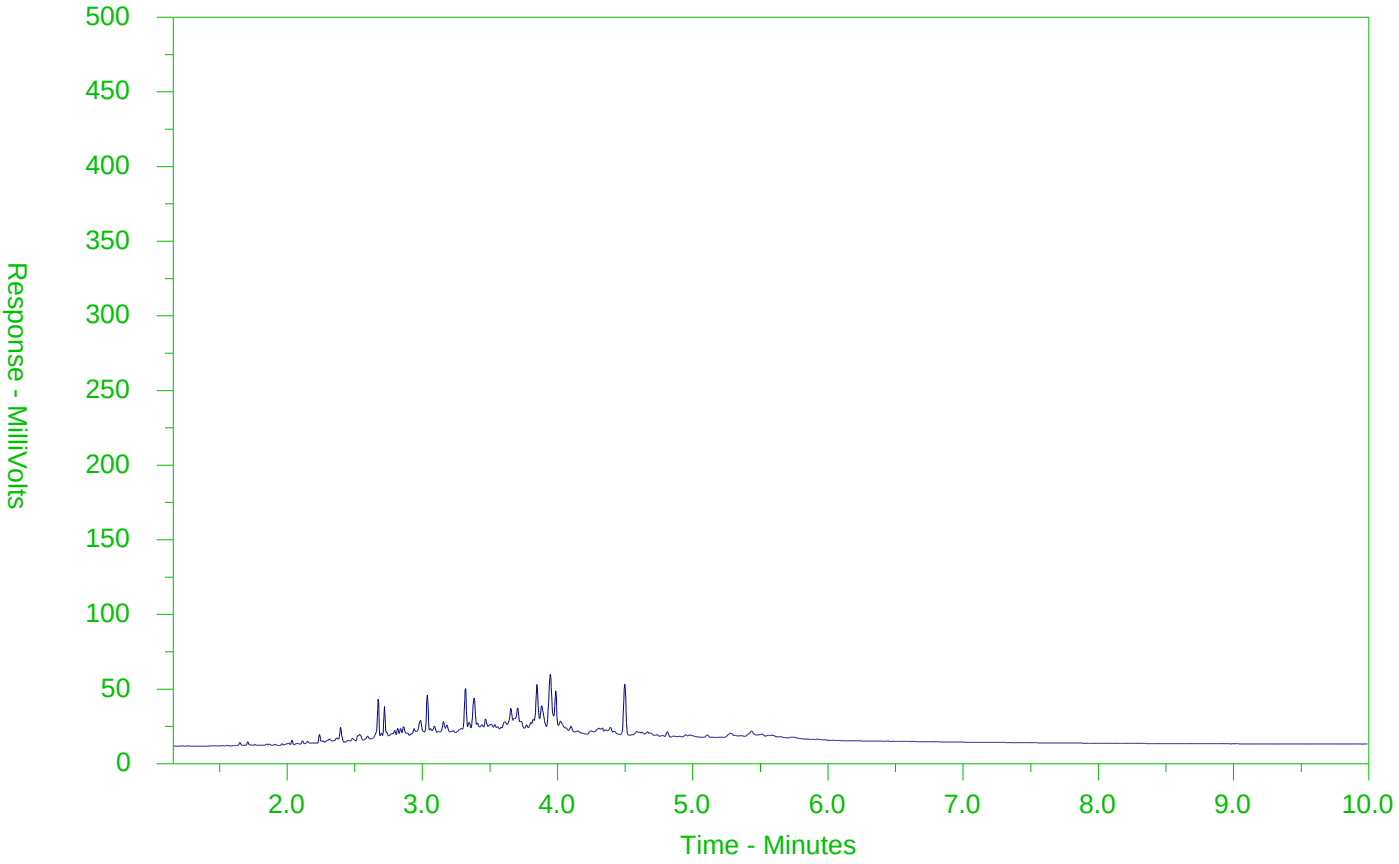
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157466-2
Client Sample ID: BH18-04-6



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

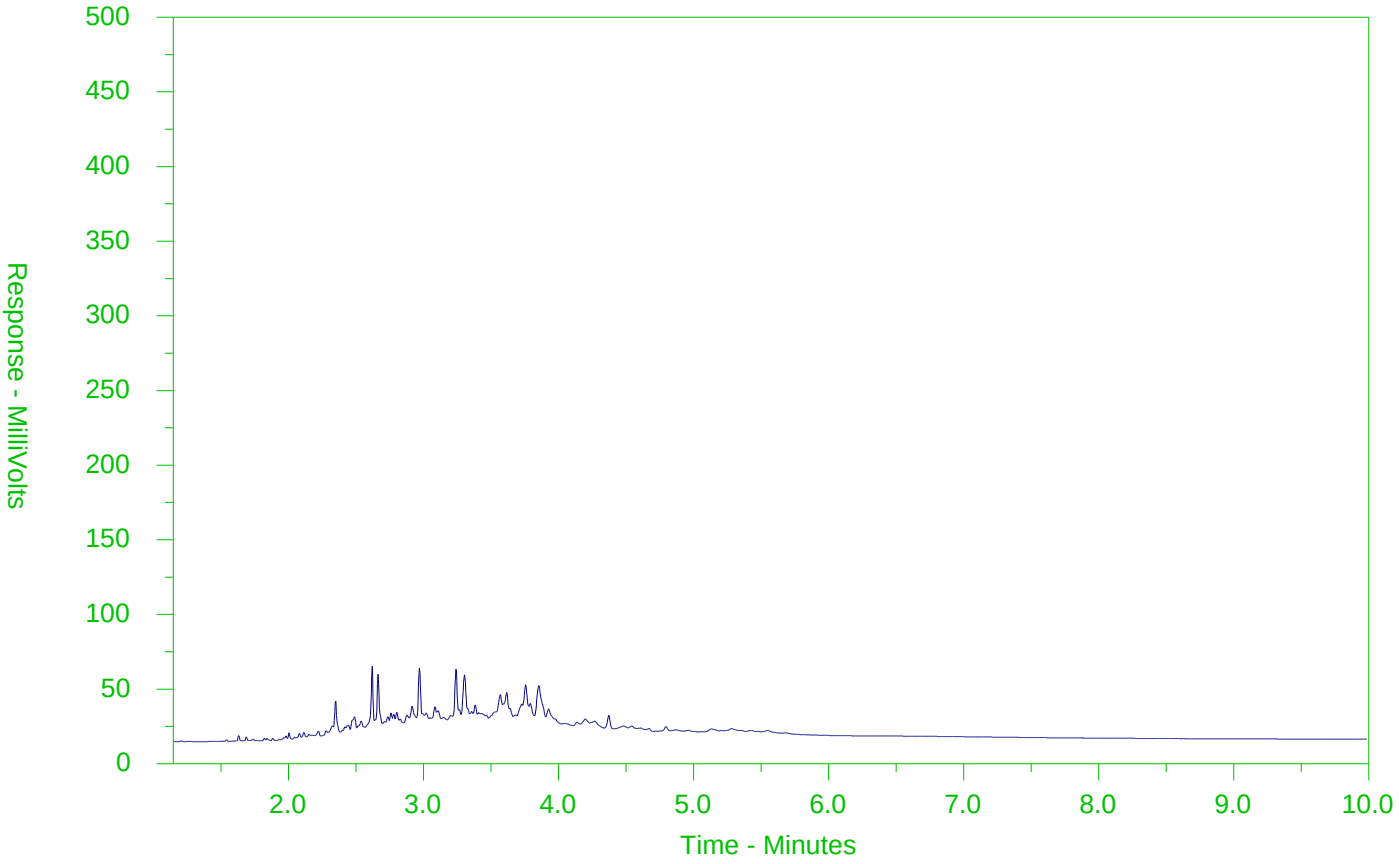
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157466-3
Client Sample ID: BH18-04-7



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

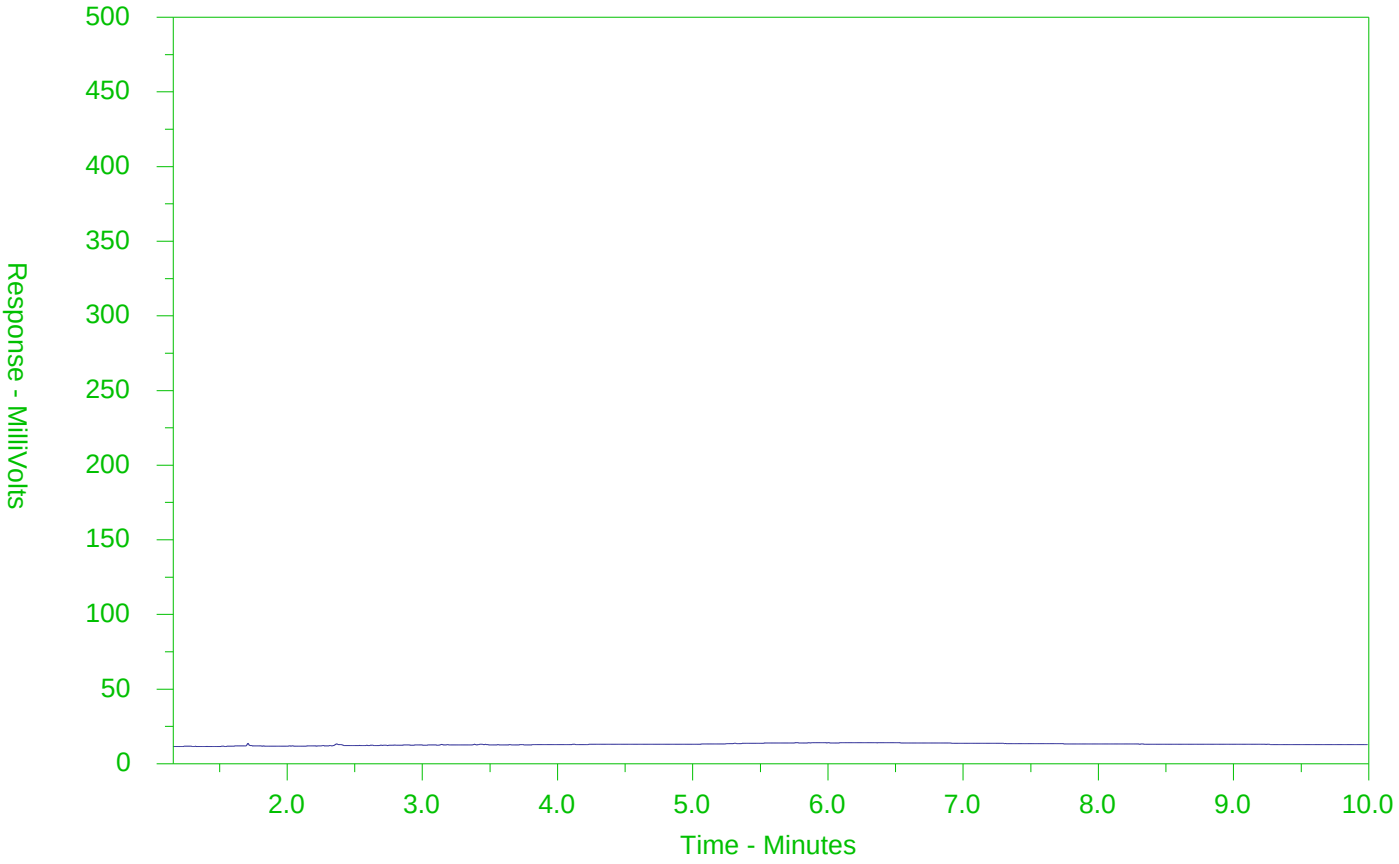
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157466-6
Client Sample ID: BH18-05-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

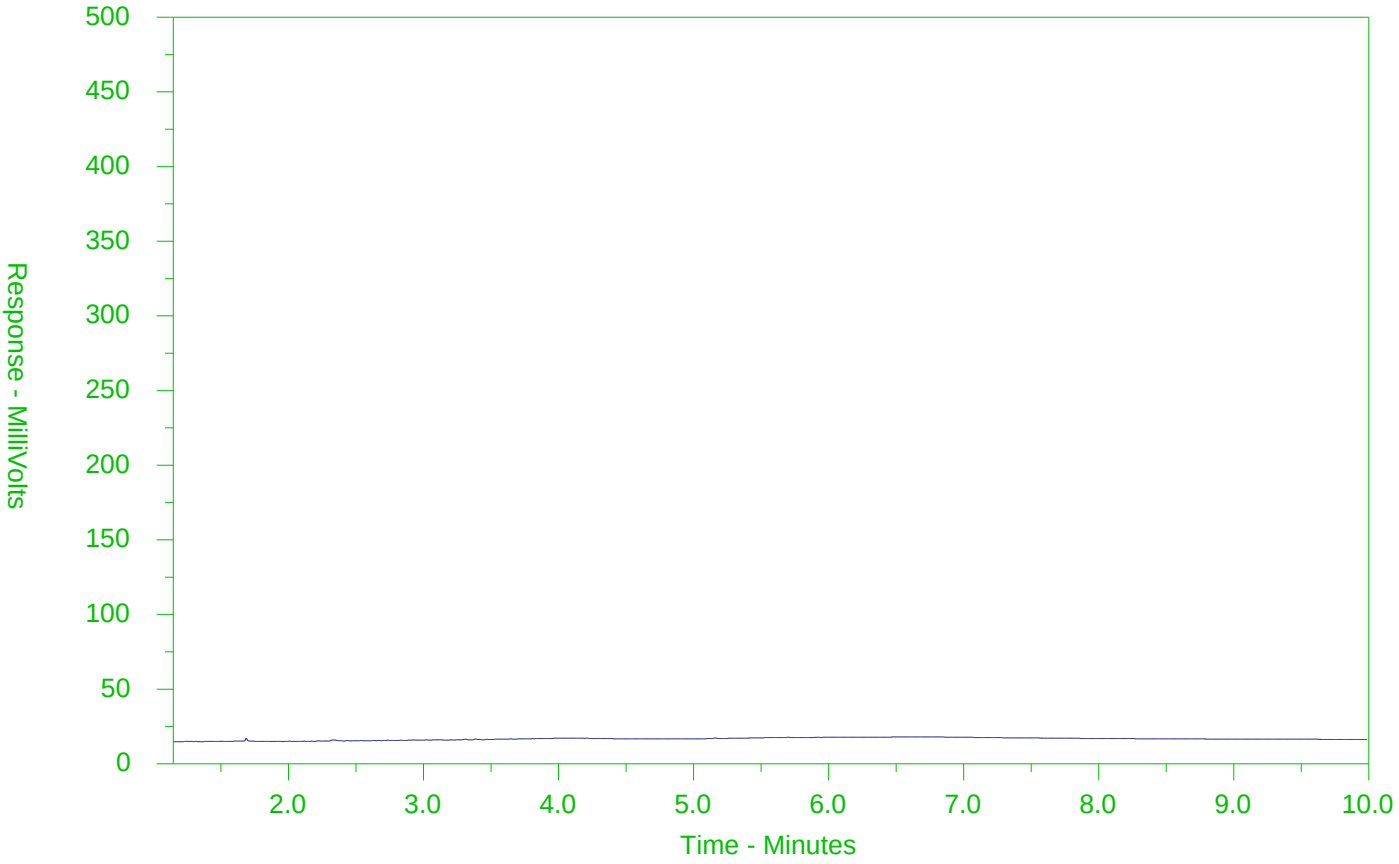
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157466-7
Client Sample ID: BH18-05-55



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

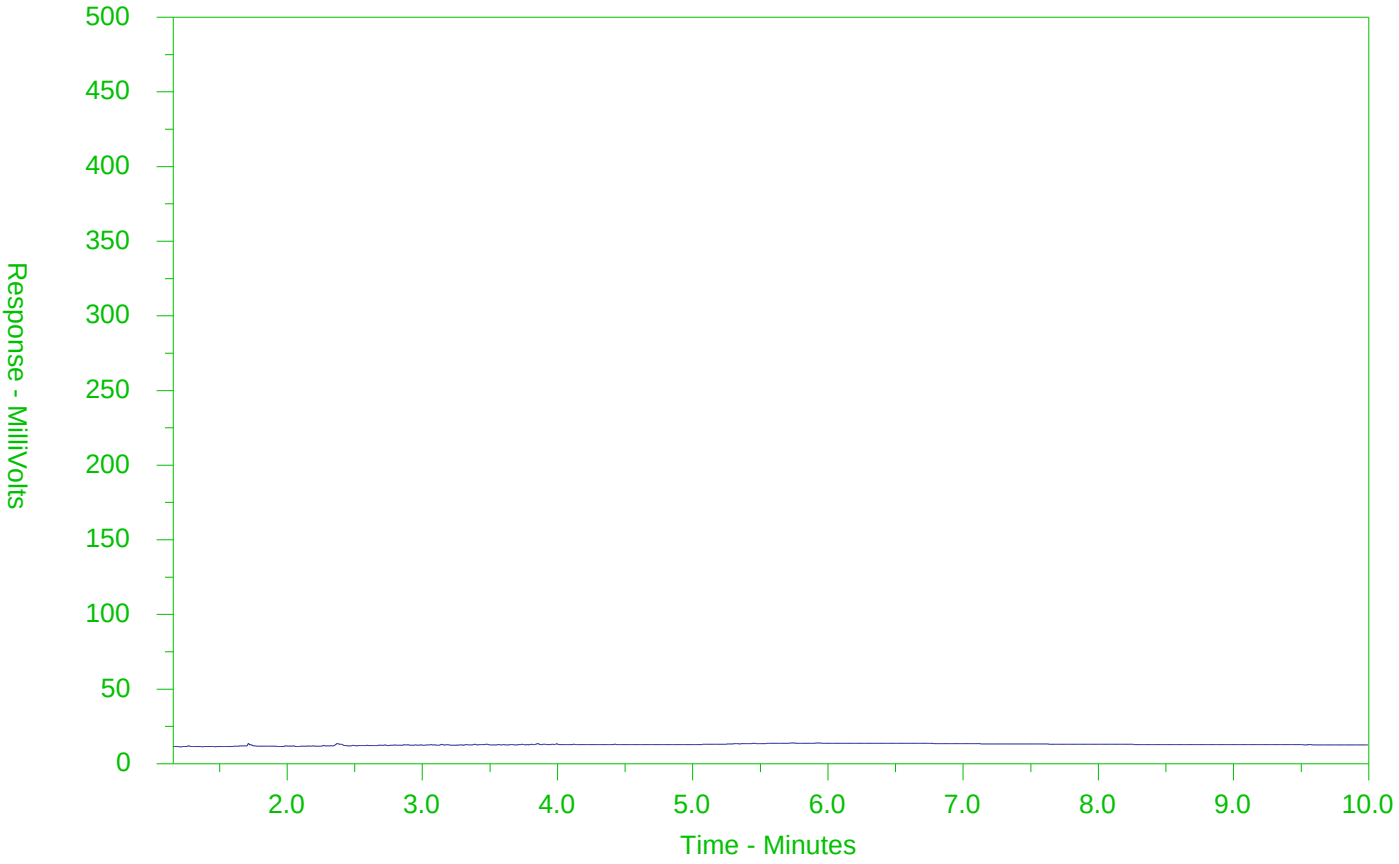
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157466-10
Client Sample ID: BH18-08-7



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2157466-COFC

COC Number: 14 - 469163

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	SNC-Lavalin Inc.	Select Report Format:	PDF EXCEL EDD (DIGITAL)	R Regular (Standard TAT if received by 3pm)
Contact:	Leon Burger	Quality Control (QC) Report with Report	Yes No	P Priority (2-4 business days if received by 3pm)
Address:	1905 Skyview Dr. Burlington, ON	Criteria on Report - provide details below if box checked		E Emergency (1-2 business days if received by 3pm)
		Select Distribution:	EMAIL MAIL FAX	E2 Same day or weekend emergency if received by 10am – contact ALS for surcharge.*
Phone:	647-355-2429	Email 1 or Fax	leon.burger@snclavalin.com	Specify Date Required for E2,E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To: Yes No	Select Invoice Distribution:	EMAIL MAIL FAX
	Copy of Invoice with Report: Yes No	Email 1 or Fax	payables@snclavalin.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	655184	GL Account:	Routing Code:
PO / AFE:	11522	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2157466

ALS Contact: Mathy

Sampler: Caitlin Rodich

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals + Inorganics	PCB	BTEX / PHC	PAH	VOC	ICP Metals + Hg		Number of Containers
	BH18-04-1/2	30-Aug-18	09:30	Soil	X	H					- PCB on hold	2
	BH18-04-6		10:00			X	X	X	X			4 per cooler
	BH18-04-7		10:15				X	X	X	X		4
	BH18-04-8B		10:20							H	- ON HOLD	1
	BH18-05-2		11:55		X	X						2
	BH18-05-5		12:30				X	X	X			3
	BH18-05-55		12:30				X	X	X			3
	BH18-05-04		12:15							X		1
	BH18-08-8		12:45				X	X	X			#1
	BH18-08-7		12:40				X		X			3
	BH18-08-8 (on hold portion)		12:45						H	- ON HOLD (use above for MS/MSD)		2
	BH18-08-3		12:10				H	H	H	- ON HOLD		

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? Yes No	Table 3+5 O.Reg 153
Are samples for human drinking water use? Yes No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen		SIF Observations	Yes	No	
Ice packs / Cubes	Yes X	No	Custody seal intact	Yes X	No
Cooling Initiated					

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.5				5.6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Caitlin Rodich	Aug 30/18	17:00	BF	Aug 31/18	15:05		AUG 31 2018	6:30 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS-FM-0326a v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 Skyview Drive
Burlington ON L7P 5B1

Date Received: 31-AUG-18
Report Date: 11-SEP-18 13:33 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2157467

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 14-469160
Legal Site Desc:

Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157467-2	BH18-06-2	Metals	Arsenic (As)	20.5	18	ug/g
			Cadmium (Cd)	2.12	1.9	ug/g
			Copper (Cu)	303	230	ug/g
			Lead (Pb)	445	120	ug/g
			Zinc (Zn)	829	340	ug/g
L2157467-4	BH18-06-5	Metals	Lead (Pb)	174	120	ug/g
L2157467-5	BH18-06-S5	Metals	Lead (Pb)	250	120	ug/g
L2157467-6	BH18-06-6	Volatile Organic Compounds	Benzene	1.18	0.32	ug/g
		Hydrocarbons	F2 (C10-C16)	7690	230	ug/g
			F3 (C16-C34)	4030	1700	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthene	499	96	ug/g
			Acenaphthylene	13.9	0.15	ug/g
			Anthracene	130	0.67	ug/g
			Benzo(a)anthracene	24.2	0.96	ug/g
			Benzo(a)pyrene	10.3	0.3	ug/g
			Benzo(b)fluoranthene	9.0	0.96	ug/g
			Benzo(k)fluoranthene	10.9	0.96	ug/g
			Chrysene	22.0	9.6	ug/g
			Dibenzo(ah)anthracene	<5.0	0.1	ug/g
			Fluoranthene	250	9.6	ug/g
			Fluorene	362	62	ug/g
			Indeno(1,2,3-cd)pyrene	<5.0	0.76	ug/g
			1+2-Methylnaphthalenes	704	76	ug/g
			1-Methylnaphthalene	207	76	ug/g
			2-Methylnaphthalene	497	76	ug/g
			Naphthalene	2360	9.6	ug/g
			Phenanthrene	705	12	ug/g
			Pyrene	152	96	ug/g
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157467-6	BH18-06-6	Hydrocarbons	F2 (C10-C16)	7690	230	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthene	499	330	ug/g
			Acenaphthylene	13.9	0.15	ug/g
			Anthracene	130	0.67	ug/g
			Benzo(a)pyrene	10.3	3.6	ug/g
			Dibenzo(ah)anthracene	<5.0	3.6	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157467-6	BH18-06-6	Polycyclic Aromatic Hydrocarbons	Fluorene	362	62	ug/g
			1+2-Methylnaphthalenes	704	76	ug/g
			1-Methylnaphthalene	207	76	ug/g
			2-Methylnaphthalene	497	76	ug/g
			Naphthalene	2360	200	ug/g
			Phenanthrene	705	270	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

			Lab ID	L2157467-2	L2157467-6	L2157467-8
			Sample Date	30-AUG-18	30-AUG-18	30-AUG-18
			Sample ID	BH18-06-2	BH18-06-6	BH18-06-8B
Analyte	**Unit**	**Guide Limits #1**	**#2**			
Conductivity	mS/cm	1.4	-	0.195		
% Moisture	%	-	-	15.9	15.5	15.8
pH	pH units	-	-	7.42		

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - SOIL

			Lab ID	L2157467-2
			Sample Date	30-AUG-18
			Sample ID	BH18-06-2
		Guide Limits		
Analyte	Unit	#1	#2	
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

		Guide Limits		Lab ID	Sample Date	Sample ID
Analyte	Unit	#1	#2			
				L2157467-2	30-AUG-18	BH18-06-2
SAR	SAR	12	-	<0.10 SAR:DL		
Calcium (Ca)	mg/L	-	-	7.8		
Magnesium (Mg)	mg/L	-	-	<1.0		
Sodium (Na)	mg/L	-	-	<1.0		

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID L2157467-2	Lab ID L2157467-4	Lab ID L2157467-5
				Sample Date 30-AUG-18	Sample Date 30-AUG-18	Sample Date 30-AUG-18
				Sample ID BH18-06-2	Sample ID BH18-06-5	Sample ID BH18-06-S5
Antimony (Sb)	ug/g	40	63	2.0	2.1	2.1
Arsenic (As)	ug/g	18	47	20.5	12.2	9.3
Barium (Ba)	ug/g	670	7700	222	92.6	126
Beryllium (Be)	ug/g	8	60	1.16	0.89	<0.50
Boron (B)	ug/g	120	5000	20.1	13.8	9.4
Boron (B), Hot Water Ext.	ug/g	2	5000	0.23		
Cadmium (Cd)	ug/g	1.9	7.9	2.12	<0.50	0.58
Chromium (Cr)	ug/g	160	11000	28.8	13.7	15.7
Cobalt (Co)	ug/g	80	2500	13.2	6.8	6.1
Copper (Cu)	ug/g	230	5600	303	74.0	154
Lead (Pb)	ug/g	120	1000	445	174	250
Mercury (Hg)	ug/g	3.9	13	1.64 DLHC	1.32 DLHC	2.99 DLHC
Molybdenum (Mo)	ug/g	40	1200	2.3	1.2	<1.0
Nickel (Ni)	ug/g	270	510	32.1	17.0	14.4
Selenium (Se)	ug/g	5.5	1200	1.7	1.6	1.4
Silver (Ag)	ug/g	40	490	0.37	<0.20	0.41
Thallium (Tl)	ug/g	3.3	33	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	300	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	160	43.6	26.8	23.5
Zinc (Zn)	ug/g	340	15000	829	205	229

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

			Lab ID	L2157467-2
			Sample Date	30-AUG-18
			Sample ID	BH18-06-2
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Chromium, Hexavalent	ug/g	8	40	<0.20

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

				Lab ID	L2157467-6	L2157467-8
				Sample Date	30-AUG-18	30-AUG-18
				Sample ID	BH18-06-6	BH18-06-8B
Analyte	Unit	Guide Limits #1	#2			
Acetone	ug/g	16	16		<0.50	<0.50
Benzene	ug/g	0.32	6.1		1.18	<0.0068
Bromodichloromethane	ug/g	18	50		<0.050	<0.050
Bromoform	ug/g	0.61	2		<0.050	<0.050
Bromomethane	ug/g	0.05	0.05		<0.050	<0.050
Carbon tetrachloride	ug/g	0.21	0.43		<0.050	<0.050
Chlorobenzene	ug/g	2.4	2.4		<0.050	<0.050
Dibromochloromethane	ug/g	13	48		<0.050	<0.050
Chloroform	ug/g	0.47	0.85		<0.050	<0.050
1,2-Dibromoethane	ug/g	0.05	0.05		<0.050	<0.050
1,2-Dichlorobenzene	ug/g	6.8	60		<0.050	<0.050
1,3-Dichlorobenzene	ug/g	9.6	59		<0.050	<0.050
1,4-Dichlorobenzene	ug/g	0.2	0.39		<0.050	<0.050
Dichlorodifluoromethane	ug/g	16	16		<0.050	<0.050
1,1-Dichloroethane	ug/g	17	120		<0.050	<0.050
1,2-Dichloroethane	ug/g	0.05	0.055		<0.050	<0.050
1,1-Dichloroethylene	ug/g	0.064	0.12		<0.050	<0.050
cis-1,2-Dichloroethylene	ug/g	55	110		<0.050	<0.050
trans-1,2-Dichloroethylene	ug/g	1.3	2.9		<0.050	<0.050
Methylene Chloride	ug/g	1.6	3		<0.050	<0.050
1,2-Dichloropropane	ug/g	0.16	0.33		<0.050	<0.050
cis-1,3-Dichloropropene	ug/g	-	-		<0.030	<0.030
trans-1,3-Dichloropropene	ug/g	-	-		<0.030	<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.18	0.4		<0.042	<0.042
Ethylbenzene	ug/g	9.5	17		2.64	<0.018
n-Hexane	ug/g	46	54		<0.050	<0.050
Methyl Ethyl Ketone	ug/g	70	150		<0.50	<0.50
Methyl Isobutyl Ketone	ug/g	31	64		<0.50	<0.50
MTBE	ug/g	11	14		<0.050	<0.050
Styrene	ug/g	34	66		0.381	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

		Guide Limits			
Lab ID				L2157467-6	L2157467-8
Sample Date				30-AUG-18	30-AUG-18
Sample ID				BH18-06-6	BH18-06-8B
Analyte	**Unit**	**#1**	**#2**		
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.24	<0.050	<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	<0.050
Tetrachloroethylene	ug/g	4.5	9.5	<0.050	<0.050
Toluene	ug/g	68	68	2.48	<0.080
1,1,1-Trichloroethane	ug/g	6.1	9.8	<0.050	<0.050
1,1,2-Trichloroethane	ug/g	0.05	0.068	<0.050	<0.050
Trichloroethylene	ug/g	0.91	1.8	0.012	<0.010
Trichlorofluoromethane	ug/g	4	4	<0.050	<0.050
Vinyl chloride	ug/g	0.032	0.057	<0.020	<0.020
o-Xylene	ug/g	-	-	3.05	<0.020
m+p-Xylenes	ug/g	-	-	7.29	<0.030
Xylenes (Total)	ug/g	26	26	10.3	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	97.4	98.4
Surrogate: 1,4-Difluorobenzene	%	-	-	99.3	108.5

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Hydrocarbons - SOIL

			Lab ID	L2157467-6	L2157467-8
			Sample Date	30-AUG-18	30-AUG-18
			Sample ID	BH18-06-6	BH18-06-8B
Analyte	**Unit**	**Guide Limits #1**	**#2**		
F1 (C6-C10)	ug/g	55	55	26.4	<5.0
F1-BTEX	ug/g	55	55	9.8	<5.0
F2 (C10-C16)	ug/g	230	230	7690 DLHC	15
F2-Naphth	ug/g	-	-	5320	11
F3 (C16-C34)	ug/g	1700	5800	4030 DLHC	<50
F3-PAH	ug/g	-	-	2870	<50
F4 (C34-C50)	ug/g	3300	6900	<250 DLHC	<50
Total Hydrocarbons (C6-C50)	ug/g	-	-	11700	<72
Chrom. to baseline at nC50		-	-	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	100.5	94.3
Surrogate: 3,4-Dichlorotoluene	%	-	-	45.1 SOL:MI	88.4

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

			Lab ID	L2157467-6	L2157467-8
			Sample Date	30-AUG-18	30-AUG-18
			Sample ID	BH18-06-6	BH18-06-8B
Analyte	**Unit**	**Guide Limits #1**	**#2**		
Acenaphthene	ug/g	96	330	499 DLM	1.14
Acenaphthylene	ug/g	0.15	0.15	13.9 DLM	<0.050
Anthracene	ug/g	0.67	0.67	130 DLM	0.511
Benzo(a)anthracene	ug/g	0.96	36	24.2 DLM	0.097
Benzo(a)pyrene	ug/g	0.3	3.6	10.3 DLM	<0.050
Benzo(b)fluoranthene	ug/g	0.96	36	9.0 DLM	<0.050
Benzo(g,h,i)perylene	ug/g	9.6	360	<5.0 DLM	<0.050
Benzo(k)fluoranthene	ug/g	0.96	36	10.9 DLM	<0.050
Chrysene	ug/g	9.6	360	22.0 DLM	0.089
Dibenzo(ah)anthracene	ug/g	0.1	3.6	<5.0 DLM	<0.050
Fluoranthene	ug/g	9.6	360	250 DLM	0.924
Fluorene	ug/g	62	62	362 DLM	1.06
Indeno(1,2,3-cd)pyrene	ug/g	0.76	36	<5.0 DLM	<0.050
1+2-Methylnaphthalenes	ug/g	76	76	704	1.10
1-Methylnaphthalene	ug/g	76	76	207 DLM	0.331
2-Methylnaphthalene	ug/g	76	76	497 DLM	0.767
Naphthalene	ug/g	9.6	200	2360 DLHC	3.71
Phenanthrene	ug/g	12	270	705 DLM	2.66
Pyrene	ug/g	96	2600	152 DLM	0.555
Surrogate: 2-Fluorobiphenyl	%	-	-	N/A SDO:R NA	86.2
Surrogate: p-Terphenyl d14	%	-	-	N/A SDO:R NA	99.2

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
SAR:DL	SAR is incalculable due to undetectable Na. Detection Limit represents maximum possible SAR value.
SOL:MI	Surrogate recovery outside acceptable limits due to matrix interference
SDO:RNA	Surrogate diluted out:% recovery not available
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

14-469160

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2157467 Report Date: 11-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4208628								
WG2871923-4 DUP		**L2157831-4**						
Boron (B), Hot Water Ext.		0.13	0.12		ug/g	4.3	30	10-SEP-18
WG2871923-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			78.6		%		70-130	10-SEP-18
WG2871923-3 LCS								
Boron (B), Hot Water Ext.			95.6		%		70-130	10-SEP-18
WG2871923-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	10-SEP-18
CN-WAD-R511-WT	**Soil**							
Batch R4207717								
WG2870073-7 DUP		**L2157466-5**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	10-SEP-18
WG2870073-6 LCS								
Cyanide, Weak Acid Diss			94.7		%		80-120	10-SEP-18
WG2870073-5 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	10-SEP-18
WG2870073-8 MS		**L2157466-5**						
Cyanide, Weak Acid Diss			98.2		%		70-130	10-SEP-18
CR-CR6-IC-WT	**Soil**							
Batch R4206534								
WG2870090-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			91.0		%		70-130	10-SEP-18
WG2870090-3 DUP		**L2157395-3**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	10-SEP-18
WG2870090-2 LCS								
Chromium, Hexavalent			98.0		%		80-120	10-SEP-18
WG2870090-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	10-SEP-18
EC-WT	**Soil**							
Batch R4207549								
WG2871920-4 DUP		**WG2871920-3**						
Conductivity		1.27	1.27		mS/cm	0.6	20	10-SEP-18
WG2871920-2 IRM		**WT SAR2**						
Conductivity			89.8		%		70-130	10-SEP-18
WG2871963-1 LCS								
Conductivity			100.5		%		90-110	10-SEP-18
WG2871920-1 MB								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	**Soil**							
Batch R4207549								
WG2871920-1 MB								
Conductivity			<0.0040		mS/cm		0.004	10-SEP-18
F1-HS-511-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	10-SEP-18
WG2867573-2 LCS								
F1 (C6-C10)			95.4		%		80-120	10-SEP-18
WG2867573-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	10-SEP-18
Surrogate: 3,4-Dichlorotoluene			99.0		%		60-140	10-SEP-18
WG2867573-6 MS		**L2157464-11**						
F1 (C6-C10)			73.4		%		60-140	10-SEP-18
F2-F4-511-WT	**Soil**							
Batch R4204899								
WG2868951-3 DUP		**WG2868951-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	07-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	07-SEP-18
WG2868951-2 LCS								
F2 (C10-C16)			103.5		%		80-120	07-SEP-18
F3 (C16-C34)			102.9		%		80-120	07-SEP-18
F4 (C34-C50)			109.1		%		80-120	07-SEP-18
WG2868951-1 MB								
F2 (C10-C16)			<10		ug/g		10	07-SEP-18
F3 (C16-C34)			<50		ug/g		50	07-SEP-18
F4 (C34-C50)			<50		ug/g		50	07-SEP-18
Surrogate: 2-Bromobenzotrifluoride			95.7		%		60-140	07-SEP-18
WG2868951-4 MS		**WG2868951-5**						
F2 (C10-C16)			102.6		%		60-140	07-SEP-18
F3 (C16-C34)			101.3		%		60-140	07-SEP-18
F4 (C34-C50)			106.6		%		60-140	07-SEP-18
HG-200.2-CVAA-WT	**Soil**							

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-WT	**Soil**							
Batch R4207089								
WG2871910-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			105.2		%		70-130	10-SEP-18
WG2871910-6 DUP		**WG2871910-5**						
Mercury (Hg)		0.0254	0.0248		ug/g	2.6	40	10-SEP-18
WG2871910-3 LCS								
Mercury (Hg)			115.0		%		80-120	10-SEP-18
WG2871910-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	10-SEP-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4209167								
WG2871910-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			112.6		%		70-130	10-SEP-18
Arsenic (As)			121.6		%		70-130	10-SEP-18
Barium (Ba)			120.2		%		70-130	10-SEP-18
Beryllium (Be)			109.3		%		70-130	10-SEP-18
Boron (B)			3.1		mg/kg		0-8.2	10-SEP-18
Cadmium (Cd)			117.0		%		70-130	10-SEP-18
Chromium (Cr)			112.0		%		70-130	10-SEP-18
Cobalt (Co)			110.8		%		70-130	10-SEP-18
Copper (Cu)			117.5		%		70-130	10-SEP-18
Lead (Pb)			108.8		%		70-130	10-SEP-18
Molybdenum (Mo)			111.9		%		70-130	10-SEP-18
Nickel (Ni)			114.6		%		70-130	10-SEP-18
Selenium (Se)			0.38		mg/kg		0.11-0.51	10-SEP-18
Silver (Ag)			0.26		mg/kg		0.13-0.33	10-SEP-18
Thallium (Tl)			0.125		mg/kg		0.077-0.18	10-SEP-18
Uranium (U)			102.4		%		70-130	10-SEP-18
Vanadium (V)			113.0		%		70-130	10-SEP-18
Zinc (Zn)			110.1		%		70-130	10-SEP-18
WG2871910-6 DUP		**WG2871910-5**						
Antimony (Sb)		0.18	0.19		ug/g	2.9	30	10-SEP-18
Arsenic (As)		6.34	6.45		ug/g	1.6	30	10-SEP-18
Barium (Ba)		133	145		ug/g	8.5	40	10-SEP-18
Beryllium (Be)		0.85	0.92		ug/g	7.4	30	10-SEP-18
Boron (B)		8.8	9.6		ug/g	9.0	30	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4209167								
WG2871910-6 DUP		**WG2871910-5**						
Cadmium (Cd)		0.288	0.242		ug/g	17	30	10-SEP-18
Chromium (Cr)		29.5	31.2		ug/g	5.7	30	10-SEP-18
Cobalt (Co)		12.8	13.2		ug/g	3.6	30	10-SEP-18
Copper (Cu)		31.2	31.9		ug/g	2.4	30	10-SEP-18
Lead (Pb)		24.7	26.0		ug/g	5.2	40	10-SEP-18
Molybdenum (Mo)		0.61	0.70		ug/g	14	40	10-SEP-18
Nickel (Ni)		30.8	31.3		ug/g	1.8	30	10-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	10-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	10-SEP-18
Thallium (Tl)		0.177	0.194		ug/g	8.9	30	10-SEP-18
Uranium (U)		0.648	0.673		ug/g	3.8	30	10-SEP-18
Vanadium (V)		42.0	43.5		ug/g	3.5	30	10-SEP-18
Zinc (Zn)		120	111		ug/g	7.7	30	10-SEP-18
WG2871910-4 LCS								
Antimony (Sb)			105.4		%		80-120	10-SEP-18
Arsenic (As)			116.9		%		80-120	10-SEP-18
Barium (Ba)			113.8		%		80-120	10-SEP-18
Beryllium (Be)			98.0		%		80-120	10-SEP-18
Boron (B)			97.9		%		80-120	10-SEP-18
Cadmium (Cd)			119.4		%		80-120	10-SEP-18
Chromium (Cr)			113.9		%		80-120	10-SEP-18
Cobalt (Co)			109.2		%		80-120	10-SEP-18
Copper (Cu)			113.2		%		80-120	10-SEP-18
Lead (Pb)			107.3		%		80-120	10-SEP-18
Molybdenum (Mo)			102.4		%		80-120	10-SEP-18
Nickel (Ni)			111.9		%		80-120	10-SEP-18
Selenium (Se)			119.3		%		80-120	10-SEP-18
Silver (Ag)			117.8		%		80-120	10-SEP-18
Thallium (Tl)			109.7		%		80-120	10-SEP-18
Uranium (U)			117.6		%		80-120	10-SEP-18
Vanadium (V)			117.8		%		80-120	10-SEP-18
Zinc (Zn)			106.8		%		80-120	10-SEP-18
WG2871910-1 MB								
							0.1	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4209167								
WG2871910-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	10-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	10-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	10-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	10-SEP-18
Boron (B)			<5.0		mg/kg		5	10-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	10-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	10-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	10-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	10-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	10-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	10-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	10-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	10-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	10-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	10-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	10-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	10-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	10-SEP-18
MOISTURE-WT	**Soil**							
Batch R4204530								
WG2870144-3 DUP		**L2157471-5**						
% Moisture		19.3	20.0		%	3.9	20	08-SEP-18
WG2870144-2 LCS								
% Moisture			100.1		%		90-110	08-SEP-18
WG2870144-1 MB								
% Moisture			<0.10		%		0.1	08-SEP-18
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-3 DUP		**WG2868979-5**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	10-SEP-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	10-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-3 DUP		**WG2868979-5**						
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	10-SEP-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	10-SEP-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	10-SEP-18
WG2868979-2 LCS								
1-Methylnaphthalene			93.8		%		50-140	10-SEP-18
2-Methylnaphthalene			92.8		%		50-140	10-SEP-18
Acenaphthene			92.6		%		50-140	10-SEP-18
Acenaphthylene			86.8		%		50-140	10-SEP-18
Anthracene			87.8		%		50-140	10-SEP-18
Benzo(a)anthracene			85.9		%		50-140	10-SEP-18
Benzo(a)pyrene			88.4		%		50-140	10-SEP-18
Benzo(b)fluoranthene			89.2		%		50-140	10-SEP-18
Benzo(g,h,i)perylene			71.5		%		50-140	10-SEP-18
Benzo(k)fluoranthene			98.6		%		50-140	10-SEP-18
Chrysene			91.1		%		50-140	10-SEP-18
Dibenzo(ah)anthracene			74.8		%		50-140	10-SEP-18
Fluoranthene			96.5		%		50-140	10-SEP-18
Fluorene			87.1		%		50-140	10-SEP-18
Indeno(1,2,3-cd)pyrene			60.3		%		50-140	10-SEP-18
Naphthalene			91.5		%		50-140	10-SEP-18
Phenanthrene			90.6		%		50-140	10-SEP-18
Pyrene			98.5		%		50-140	10-SEP-18
WG2868979-1 MB								
							0.03	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	10-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	10-SEP-18
Acenaphthene			<0.050		ug/g		0.05	10-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	10-SEP-18
Anthracene			<0.050		ug/g		0.05	10-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	10-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	10-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	10-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Chrysene			<0.050		ug/g		0.05	10-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	10-SEP-18
Fluoranthene			<0.050		ug/g		0.05	10-SEP-18
Fluorene			<0.050		ug/g		0.05	10-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	10-SEP-18
Naphthalene			<0.013		ug/g		0.013	10-SEP-18
Phenanthrene			<0.046		ug/g		0.046	10-SEP-18
Pyrene			<0.050		ug/g		0.05	10-SEP-18
Surrogate: 2-Fluorobiphenyl			88.4		%		50-140	10-SEP-18
Surrogate: p-Terphenyl d14			98.8		%		50-140	10-SEP-18
WG2868979-4 MS		**WG2868979-5**						
1-Methylnaphthalene			92.9		%		50-140	10-SEP-18
2-Methylnaphthalene			93.1		%		50-140	10-SEP-18
Acenaphthene			91.1		%		50-140	10-SEP-18
Acenaphthylene			86.1		%		50-140	10-SEP-18
Anthracene			89.9		%		50-140	10-SEP-18
Benzo(a)anthracene			86.9		%		50-140	10-SEP-18
Benzo(a)pyrene			87.7		%		50-140	10-SEP-18
Benzo(b)fluoranthene			92.9		%		50-140	10-SEP-18
Benzo(g,h,i)perylene			60.3		%		50-140	10-SEP-18
Benzo(k)fluoranthene			98.5		%		50-140	10-SEP-18
Chrysene			89.1		%		50-140	10-SEP-18
Dibenzo(ah)anthracene			65.7		%		50-140	10-SEP-18
Fluoranthene			95.1		%		50-140	10-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4206574								
WG2868979-4 MS		**WG2868979-5**						
Fluorene			86.3		%		50-140	10-SEP-18
Indeno(1,2,3-cd)pyrene			55.4		%		50-140	10-SEP-18
Naphthalene			91.8		%		50-140	10-SEP-18
Phenanthrene			90.0		%		50-140	10-SEP-18
Pyrene			97.4		%		50-140	10-SEP-18
PH-WT	**Soil**							
Batch R4204225								
WG2869309-1 DUP		**L2157436-2**						
pH		7.89	7.89	J	pH units	0.00	0.3	06-SEP-18
WG2869777-1 LCS								
pH			6.98		pH units		6.9-7.1	06-SEP-18
SAR-R511-WT	**Soil**							
Batch R4208567								
WG2871920-4 DUP		**WG2871920-3**						
Calcium (Ca)		35.7	35.2		mg/L	1.3	30	10-SEP-18
Sodium (Na)		163	161		mg/L	1.1	30	10-SEP-18
Magnesium (Mg)		12.3	12.2		mg/L	1.3	30	10-SEP-18
WG2871920-2 IRM		**WT SAR2**						
Calcium (Ca)			79.3		%		70-130	10-SEP-18
Sodium (Na)			96.7		%		70-130	10-SEP-18
Magnesium (Mg)			78.2		%		70-130	10-SEP-18
WG2871920-1 MB								
Calcium (Ca)			<1.0		mg/L		1	10-SEP-18
Sodium (Na)			<1.0		mg/L		1	10-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	10-SEP-18
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	07-SEP-18
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	07-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	07-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	07-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	07-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	07-SEP-18
Trichlorofluoromethane		<0.050	<0.050		ug/g			07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-4 DUP		**WG2867573-3**						
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	07-SEP-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	07-SEP-18
WG2867573-2 LCS								
1,1,1,2-Tetrachloroethane			100.3		%		60-130	07-SEP-18
1,1,2,2-Tetrachloroethane			104.8		%		60-130	07-SEP-18
1,1,1-Trichloroethane			100.7		%		60-130	07-SEP-18
1,1,2-Trichloroethane			106.3		%		60-130	07-SEP-18
1,1-Dichloroethane			106.7		%		60-130	07-SEP-18
1,1-Dichloroethylene			91.1		%		60-130	07-SEP-18
1,2-Dibromoethane			107.6		%		70-130	07-SEP-18
1,2-Dichlorobenzene			109.2		%		70-130	07-SEP-18
1,2-Dichloroethane			109.8		%		60-130	07-SEP-18
1,2-Dichloropropane			106.5		%		70-130	07-SEP-18
1,3-Dichlorobenzene			108.8		%		70-130	07-SEP-18
1,4-Dichlorobenzene			110.2		%		70-130	07-SEP-18
Acetone			116.1		%		60-140	07-SEP-18
Benzene			107.6		%		70-130	07-SEP-18
Bromodichloromethane			108.5		%		50-140	07-SEP-18
Bromoform			105.3		%		70-130	07-SEP-18
Bromomethane			83.0		%		50-140	07-SEP-18
Carbon tetrachloride			101.0		%		70-130	07-SEP-18
Chlorobenzene			105.7		%		70-130	07-SEP-18
Chloroform			107.6		%		70-130	07-SEP-18
cis-1,2-Dichloroethylene			104.9		%		70-130	07-SEP-18
cis-1,3-Dichloropropene			111.5		%		70-130	07-SEP-18
Dibromochloromethane			107.3		%		60-130	07-SEP-18
Dichlorodifluoromethane			76.7		%		50-140	07-SEP-18
Ethylbenzene			97.8		%		70-130	07-SEP-18
n-Hexane			113.0		%		70-130	07-SEP-18
Methylene Chloride			108.3		%		70-130	07-SEP-18
MTBE			103.7		%		70-130	07-SEP-18
m+p-Xylenes			102.9		%		70-130	07-SEP-18
Methyl Ethyl Ketone			115.6		%		60-140	07-SEP-18
Methyl Isobutyl Ketone			104.0		%		60-140	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-2 LCS								
o-Xylene			96.2		%		70-130	07-SEP-18
Styrene			99.8		%		70-130	07-SEP-18
Tetrachloroethylene			100.2		%		60-130	07-SEP-18
Toluene			97.3		%		70-130	07-SEP-18
trans-1,2-Dichloroethylene			102.0		%		60-130	07-SEP-18
trans-1,3-Dichloropropene			106.6		%		70-130	07-SEP-18
Trichloroethylene			105.9		%		60-130	07-SEP-18
Trichlorofluoromethane			101.4		%		50-140	07-SEP-18
Vinyl chloride			88.5		%		60-140	07-SEP-18
WG2867573-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1-Dichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	07-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	07-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	07-SEP-18
Acetone			<0.50		ug/g		0.5	07-SEP-18
Benzene			<0.0068		ug/g		0.0068	07-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	07-SEP-18
Bromoform			<0.050		ug/g		0.05	07-SEP-18
Bromomethane			<0.050		ug/g		0.05	07-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	07-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	07-SEP-18
Chloroform			<0.050		ug/g		0.05	07-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	07-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	07-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-1 MB								
Ethylbenzene			<0.018		ug/g		0.018	07-SEP-18
n-Hexane			<0.050		ug/g		0.05	07-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	07-SEP-18
MTBE			<0.050		ug/g		0.05	07-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	07-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	07-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	07-SEP-18
o-Xylene			<0.020		ug/g		0.02	07-SEP-18
Styrene			<0.050		ug/g		0.05	07-SEP-18
Tetrachloroethylene			<0.050		ug/g		0.05	07-SEP-18
Toluene			<0.080		ug/g		0.08	07-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	07-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	07-SEP-18
Trichloroethylene			<0.010		ug/g		0.01	07-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	07-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	07-SEP-18
Surrogate: 1,4-Difluorobenzene			103.7		%		50-140	07-SEP-18
Surrogate: 4-Bromofluorobenzene			95.8		%		50-140	07-SEP-18
WG2867573-5 MS		**L2157464-10**						
1,1,1,2-Tetrachloroethane			107.2		%		50-140	07-SEP-18
1,1,2,2-Tetrachloroethane			111.3		%		50-140	07-SEP-18
1,1,1-Trichloroethane			108.5		%		50-140	07-SEP-18
1,1,2-Trichloroethane			113.0		%		50-140	07-SEP-18
1,1-Dichloroethane			115.2		%		50-140	07-SEP-18
1,1-Dichloroethylene			99.0		%		50-140	07-SEP-18
1,2-Dibromoethane			113.7		%		50-140	07-SEP-18
1,2-Dichlorobenzene			115.6		%		50-140	07-SEP-18
1,2-Dichloroethane			116.8		%		50-140	07-SEP-18
1,2-Dichloropropane			114.3		%		50-140	07-SEP-18
1,3-Dichlorobenzene			114.8		%		50-140	07-SEP-18
1,4-Dichlorobenzene			116.4		%		50-140	07-SEP-18
Acetone			129.1		%		50-140	07-SEP-18
Benzene			115.8		%		50-140	07-SEP-18
Bromodichloromethane			115.6		%		50-140	07-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4204971								
WG2867573-5 MS		**L2157464-10**						
Bromoform			111.3		%		50-140	07-SEP-18
Bromomethane			88.5		%		50-140	07-SEP-18
Carbon tetrachloride			109.3		%		50-140	07-SEP-18
Chlorobenzene			112.5		%		50-140	07-SEP-18
Chloroform			115.8		%		50-140	07-SEP-18
cis-1,2-Dichloroethylene			112.6		%		50-140	07-SEP-18
cis-1,3-Dichloropropene			118.3		%		50-140	07-SEP-18
Dibromochloromethane			114.2		%		50-140	07-SEP-18
Dichlorodifluoromethane			91.8		%		50-140	07-SEP-18
Ethylbenzene			103.1		%		50-140	07-SEP-18
n-Hexane			125.1		%		50-140	07-SEP-18
Methylene Chloride			117.0		%		50-140	07-SEP-18
MTBE			110.8		%		50-140	07-SEP-18
m+p-Xylenes			109.1		%		50-140	07-SEP-18
Methyl Ethyl Ketone			122.4		%		50-140	07-SEP-18
Methyl Isobutyl Ketone			107.3		%		50-140	07-SEP-18
o-Xylene			101.4		%		50-140	07-SEP-18
Styrene			104.2		%		50-140	07-SEP-18
Tetrachloroethylene			106.7		%		50-140	07-SEP-18
Toluene			102.9		%		50-140	07-SEP-18
trans-1,2-Dichloroethylene			109.9		%		50-140	07-SEP-18
trans-1,3-Dichloropropene			106.3		%		50-140	07-SEP-18
Trichloroethylene			113.8		%		50-140	07-SEP-18
Trichlorofluoromethane			112.2		%		50-140	07-SEP-18
Vinyl chloride			97.4		%		50-140	07-SEP-18

Quality Control Report

Workorder: L2157467 Report Date: 11-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 Skyview Drive
Burlington ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

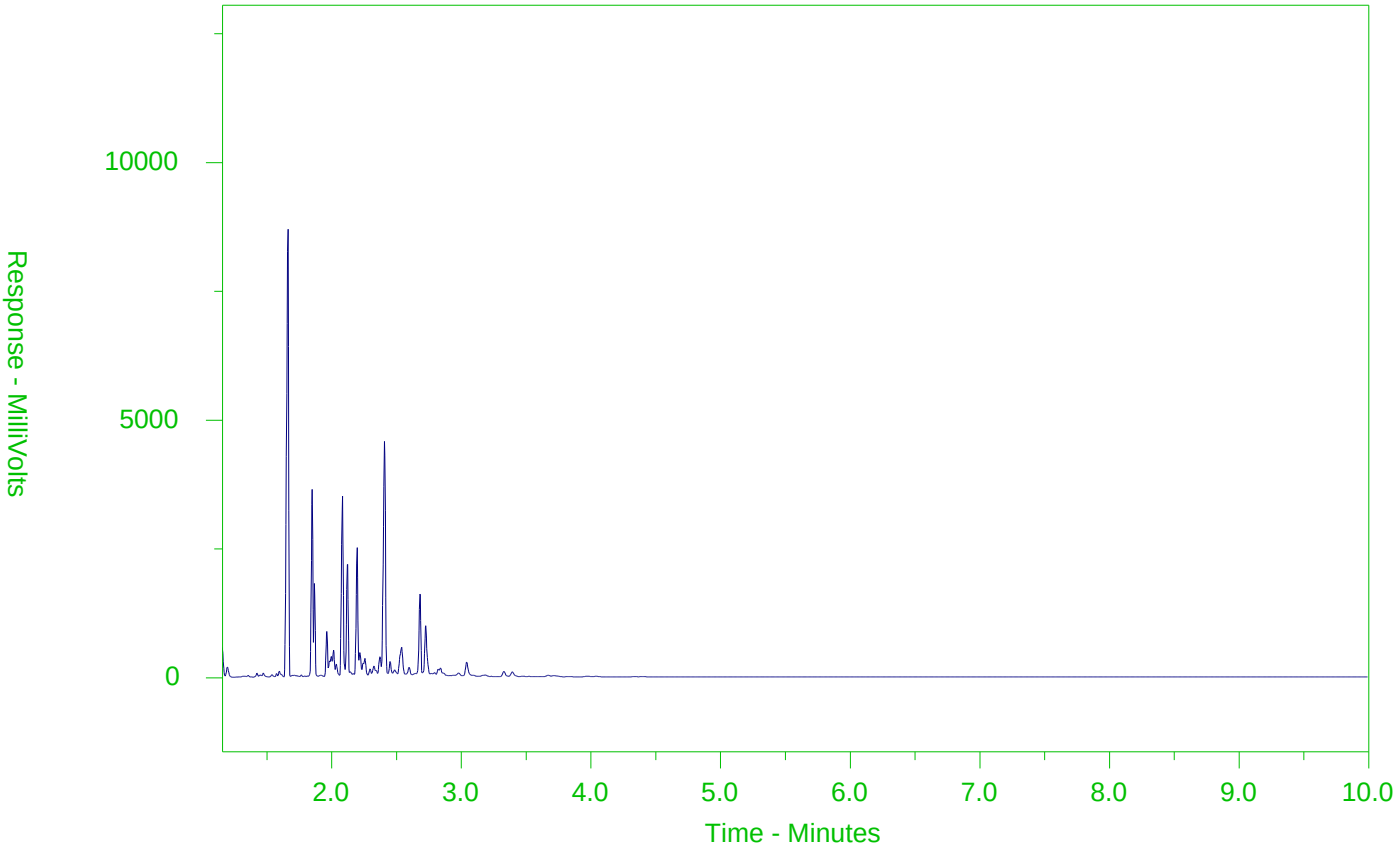
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157467-6
Client Sample ID: BH18-06-6



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

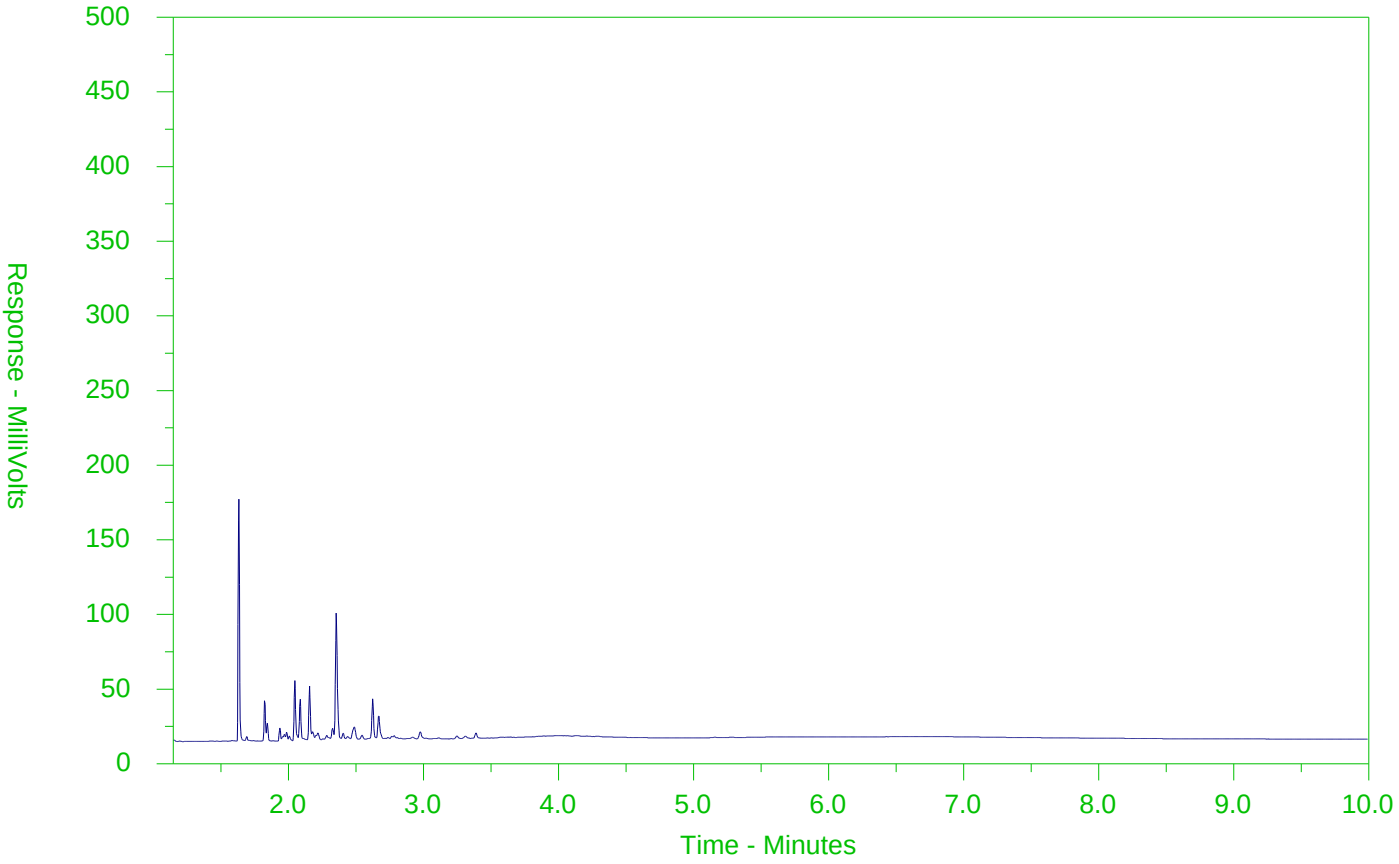
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2157467-8
Client Sample ID: BH18-06-8B



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2157467-COFC

COC Number: 14 - 469160

Page 1 of 1

Report To		Report Format / Distribution		Turnaround Time (TAT) (Rush TAT is not available for all tests)	
Company:	SNC-Lavalin Inc.	Select Report Format:	☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)	R ☒	Regular (Standard TAT if received by 3pm)
Contact:	Leon Burger	Quality Control (QC) Report with Report	☒ Yes ☐ No	P ☐	Priority (2-4 business days if received by 3pm)
Address:	1005 Skyview Dr. Burlington ON	☐ Criteria on Report - provide details below if box checked		E ☐	Emergency (1-2 business days if received by 3pm)
		Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX	E2 ☐	Same day or weekend emergency if received by 10am – contact ALS for surcharge.
Phone:	647 355 2429	Email 1 or Fax	leon.burger@snclavalin.com	Specify Date Required for E2,E or P:	
		Email 2			

Invoice To		Invoice Distribution	
	Same as Report To ☐ Yes ☐ No	Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☐ No	Email 1 or Fax	payable@snclavalin.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	655184	GL Account:	Routing Code:
PO / AFE:	11522	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2157467 | ALS Contact: Mathy | Sampler: Joey Preston

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals + Inorganics	PAH	VOC	BTEX/FI + PHC	Metals ICP + Hg			ON HOLD					Number of Containers
	BH18-06-1	30-Aug-18	14:20	Soil			H	H				X					3
	BH18-06-2		14:30		X												1
	BH18-06-4		14:50														3
	BH18-06-5		15:00			H	H	H	X			PAH, VOC, BTEX PHC					4
	BH18-06-55		15:00						X								1
	BH18-06-6		15:05			X	X	X	H			Metals on hold					4
	BH18-06-7		15:20			H	H	H	H			X All on hold					4
	BH18-06-8B		15:40			X	X	X	H			Metals on hold.					34

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☐ No	Table 3 + Table 5 O.Reg 153
Are samples for human drinking water use? ☐ Yes ☐ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs (cubes)	Yes ☒	No ☐	Custody seal intact	Yes ☒	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
1.5				5.0	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Caitlin Rodrich	2018/08/30	17:00	BF	Aug 31/18	15:05			6:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Aug 31 2018

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 31-AUG-18
Report Date: 11-SEP-18 13:38 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2157468

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 14-469161
Legal Site Desc:

Mathy Mahadeva
Account Manager

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Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157468-1	BH18-07-2	Saturated Paste Extractables	SAR	16.7	12	SAR
		Metals	Lead (Pb)	130	120	ug/g
L2157468-2	BH18-07-6	Hydrocarbons	F2 (C10-C16)	571	230	ug/g
			F3 (C16-C34)	4810	1700	ug/g
L2157468-3	BH18-07-9	Metals	Lead (Pb)	135	120	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthylene	1.86	0.15	ug/g
			Anthracene	6.55	0.67	ug/g
			Benzo(a)anthracene	17.0	0.96	ug/g
			Benzo(a)pyrene	15.4	0.3	ug/g
			Benzo(b)fluoranthene	11.8	0.96	ug/g
			Benzo(k)fluoranthene	12.1	0.96	ug/g
			Chrysene	15.7	9.6	ug/g
			Dibenzo(ah)anthracene	2.43	0.1	ug/g
			Fluoranthene	37.5	9.6	ug/g
			Indeno(1,2,3-cd)pyrene	7.09	0.76	ug/g
			Phenanthrene	16.9	12	ug/g
L2157468-4	BH18-07-12	Volatile Organic Compounds	Benzene	0.352	0.32	ug/g
		Hydrocarbons	F2 (C10-C16)	288	230	ug/g
			F3 (C16-C34)	2000	1700	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthylene	11.8	0.15	ug/g
			Anthracene	52.9	0.67	ug/g
			Benzo(a)anthracene	38.2	0.96	ug/g
			Benzo(a)pyrene	27.6	0.3	ug/g
			Benzo(b)fluoranthene	22.4	0.96	ug/g
			Benzo(k)fluoranthene	21.6	0.96	ug/g
			Chrysene	32.9	9.6	ug/g
			Dibenzo(ah)anthracene	3.70	0.1	ug/g
			Fluoranthene	95.9	9.6	ug/g
			Indeno(1,2,3-cd)pyrene	11.1	0.76	ug/g
			Phenanthrene	115	12	ug/g
L2157468-5	BH18-08-2	Cyanides	Cyanide, Weak Acid Diss	0.096	0.051	ug/g
		Metals	Cadmium (Cd)	2.28	1.9	ug/g
			Lead (Pb)	451	120	ug/g
L2157468-9	BH18-08-11	Metals	Lead (Pb)	194	120	ug/g
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
L2157468-2	BH18-07-6	Hydrocarbons	F2 (C10-C16)	571	230	ug/g
L2157468-3	BH18-07-9	Polycyclic Aromatic Hydrocarbons	Acenaphthylene	1.86	0.15	ug/g
			Anthracene	6.55	0.67	ug/g
			Benzo(a)pyrene	15.4	3.6	ug/g
L2157468-4	BH18-07-12	Hydrocarbons	F2 (C10-C16)	288	230	ug/g
		Polycyclic Aromatic Hydrocarbons	Acenaphthylene	11.8	0.15	ug/g
			Anthracene	52.9	0.67	ug/g
			Benzo(a)anthracene	38.2	36	ug/g
			Benzo(a)pyrene	27.6	3.6	ug/g
			Dibenzo(ah)anthracene	3.70	3.6	ug/g
L2157468-5	BH18-08-2	Cyanides	Cyanide, Weak Acid Diss	0.096	0.051	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

				Lab ID	L2157468-1	L2157468-2	L2157468-3	L2157468-4	L2157468-5	L2157468-6	L2157468-7	L2157468-8
				Sample Date	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18
				Sample ID	BH18-07-2	BH18-07-6	BH18-07-9	BH18-07-12	BH18-08-2	BH18-08-7	BH18-08-10	BH18-08-100
Analyte	Unit	Guide Limits #1	#2									
Conductivity	mS/cm	1.4	-	1.21				1.30				
% Moisture	%	-	-	16.9	35.6	24.8	14.2	9.64	18.2	18.2	18.6	
pH	pH units	-	-	7.38				7.52				

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - SOIL

		Guide Limits			
Lab ID				L2157468-1	L2157468-5
Sample Date				31-AUG-18	31-AUG-18
Sample ID				BH18-07-2	BH18-08-2
Analyte	**Unit**	**#1**	**#2**		
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050	0.096

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

		Guide Limits			
Lab ID				L2157468-1	L2157468-5
Sample Date				31-AUG-18	31-AUG-18
Sample ID				BH18-07-2	BH18-08-2
Analyte	**Unit**	**#1**	**#2**		
SAR	SAR	12	-	16.7	0.21
Calcium (Ca)	mg/L	-	-	10.3	210
Magnesium (Mg)	mg/L	-	-	1.4	30.1
Sodium (Na)	mg/L	-	-	216	12.6

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2157468-1 / Sample Date: 31-AUG-18 / Sample ID: BH18-07-2	Lab ID: L2157468-3 / Sample Date: 31-AUG-18 / Sample ID: BH18-07-9	Lab ID: L2157468-5 / Sample Date: 31-AUG-18 / Sample ID: BH18-08-2	Lab ID: L2157468-9 / Sample Date: 31-AUG-18 / Sample ID: BH18-08-11	Lab ID: L2157468-10 / Sample Date: 31-AUG-18 / Sample ID: BH18-08-111
Antimony (Sb)	ug/g	40	63	2.2	<1.0	6.0	<1.0	<1.0
Arsenic (As)	ug/g	18	47	5.1	5.9	8.1	3.9	4.4
Barium (Ba)	ug/g	670	7700	58.0	50.0	84.1	69.6	43.2
Beryllium (Be)	ug/g	8	60	0.51	<0.50	<0.50	<0.50	<0.50
Boron (B)	ug/g	120	5000	6.0	5.3	7.0	<5.0	<5.0
Boron (B), Hot Water Ext.	ug/g	2	5000	0.22		0.65		
Cadmium (Cd)	ug/g	1.9	7.9	<0.50	<0.50	2.28	<0.50	<0.50
Chromium (Cr)	ug/g	160	11000	13.3	11.6	16.3	8.5	9.9
Cobalt (Co)	ug/g	80	2500	6.7	5.0	7.5	4.5	5.4
Copper (Cu)	ug/g	230	5600	43.0	21.0	114	23.9	24.2
Lead (Pb)	ug/g	120	1000	130	135	451	194	85.1
Mercury (Hg)	ug/g	3.9	13	0.482	0.208	0.366	0.171	0.327
Molybdenum (Mo)	ug/g	40	1200	<1.0	<1.0	1.0	<1.0	<1.0
Nickel (Ni)	ug/g	270	510	14.8	10.0	21.7	8.6	10.6
Selenium (Se)	ug/g	5.5	1200	<1.0	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	40	490	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	ug/g	3.3	33	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	300	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	160	20.9	20.7	25.7	17.2	20.0
Zinc (Zn)	ug/g	340	15000	112	129	252	47.2	52.7

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

			Lab ID	L2157468-1	L2157468-5
			Sample Date	31-AUG-18	31-AUG-18
			Sample ID	BH18-07-2	BH18-08-2
		Guide Limits			
Analyte	**Unit**	**#1**	**#2**		
Chromium, Hexavalent	ug/g	8	40	0.23	<0.20

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID				
				L2157468-1	L2157468-2	L2157468-4	L2157468-6	L2157468-7	L2157468-8
				31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18
				BH18-07-2	BH18-07-6	BH18-07-12	BH18-08-7	BH18-08-10	BH18-08-100
Acetone	ug/g	16	16	<0.50 VOCJ		<0.50	<0.50	<0.50	<0.50
Benzene	ug/g	0.32	6.1	0.0364 VOCJ	<0.0068	0.352	0.0073	<0.0068	<0.0068
Bromodichloromethane	ug/g	18	50	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Bromoform	ug/g	0.61	2	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Bromomethane	ug/g	0.05	0.05	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Carbon tetrachloride	ug/g	0.21	0.43	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Chlorobenzene	ug/g	2.4	2.4	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	ug/g	13	48	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Chloroform	ug/g	0.47	0.85	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,2-Dibromoethane	ug/g	0.05	0.05	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	ug/g	6.8	60	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	ug/g	9.6	59	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	ug/g	0.2	0.39	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane	ug/g	16	16	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	ug/g	17	120	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	ug/g	0.05	0.055	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	ug/g	0.064	0.12	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	ug/g	55	110	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	ug/g	1.3	2.9	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Methylene Chloride	ug/g	1.6	3	<0.35 RRR		<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	ug/g	0.16	0.33	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	ug/g	-	-	<0.030 VOCJ		<0.030	<0.030	<0.030	<0.030
trans-1,3-Dichloropropene	ug/g	-	-	<0.030 VOCJ		<0.030	<0.030	<0.030	<0.030
1,3-Dichloropropene (cis & trans)	ug/g	0.18	0.4	<0.042		<0.042	<0.042	<0.042	<0.042
Ethylbenzene	ug/g	9.5	17	<0.018 VOCJ	<0.018	0.083	<0.018	<0.018	<0.018
n-Hexane	ug/g	46	54	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Methyl Ethyl Ketone	ug/g	70	150	<0.50 VOCJ		<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	ug/g	31	64	<0.50 VOCJ		<0.50	<0.50	<0.50	<0.50
MTBE	ug/g	11	14	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Styrene	ug/g	34	66	<0.050 VOCJ		0.087	<0.050	<0.050	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

				Lab ID	L2157468-1	L2157468-2	L2157468-4	L2157468-6	L2157468-7	L2157468-8
				Sample Date	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18
				Sample ID	BH18-07-2	BH18-07-6	BH18-07-12	BH18-08-7	BH18-08-10	BH18-08-100
Analyte	Unit	Guide Limits #1	#2							
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.24	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	ug/g	4.5	9.5	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Toluene	ug/g	68	68	<0.080 VOCJ	<0.080	0.403	<0.080	<0.080	<0.080
1,1,1-Trichloroethane	ug/g	6.1	9.8	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	ug/g	0.05	0.068	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Trichloroethylene	ug/g	0.91	1.8	<0.010 VOCJ		0.018	<0.010	<0.010	<0.010
Trichlorofluoromethane	ug/g	4	4	<0.050 VOCJ		<0.050	<0.050	<0.050	<0.050
Vinyl chloride	ug/g	0.032	0.057	<0.020 VOCJ		<0.020	<0.020	<0.020	<0.020
o-Xylene	ug/g	-	-	<0.020 VOCJ	<0.020	0.152	<0.020	<0.020	<0.020
m+p-Xylenes	ug/g	-	-	<0.030 VOCJ	<0.030	0.382	<0.030	<0.030	<0.030
Xylenes (Total)	ug/g	26	26	<0.050	<0.050	0.534	<0.050	<0.050	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	100.8	84.6	97.9	118.5	108.5	101.2
Surrogate: 1,4-Difluorobenzene	%	-	-	108.9	79.7	101.9	127.5	116.5	109.5

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Hydrocarbons - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID			
				L2157468-2	L2157468-4	L2157468-6	L2157468-7	L2157468-8
				31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18
				BH18-07-6	BH18-07-12	BH18-08-7	BH18-08-10	BH18-08-100
F1 (C6-C10)	ug/g	55	55	<5.0	<5.0	<5.0	<5.0	<5.0
F1-BTEX	ug/g	55	55	<5.0	<5.0	<5.0	<5.0	<5.0
F2 (C10-C16)	ug/g	230	230	571	288	<10	<10	<10
F2-Naphth	ug/g	-	-		281	<10	<10	<10
F3 (C16-C34)	ug/g	1700	5800	4810	2000	<50	<50	<50
F3-PAH	ug/g	-	-		1590	<50	<50	<50
F4 (C34-C50)	ug/g	3300	6900	351	410	<50	<50	<50
F4G-SG (GHH-Silica)	ug/g	3300	6900		1910			
Total Hydrocarbons (C6-C50)	ug/g	-	-	5730	2700	<72	<72	<72
Chrom. to baseline at nC50		-	-	YES	NO	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	98.4	104.0	90.3	95.5	93.8
Surrogate: 3,4-Dichlorotoluene	%	-	-	67.7	61.6	107.9	94.6	86.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

				Lab ID	L2157468-3	L2157468-4	L2157468-6	L2157468-7	L2157468-8
				Sample Date	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18	31-AUG-18
				Sample ID	BH18-07-9	BH18-07-12	BH18-08-7	BH18-08-10	BH18-08-100
Analyte	**Unit**	**Guide Limits #1**	**#2**						
Acenaphthene	ug/g	96	330	1.55	5.55	<0.050	<0.050	<0.050
Acenaphthylene	ug/g	0.15	0.15	1.86	11.8 DLHC	<0.050	<0.050	<0.050
Anthracene	ug/g	0.67	0.67	6.55	52.9 DLHC	0.064	<0.050	<0.050
Benzo(a)anthracene	ug/g	0.96	36	17.0 DLHC	38.2 DLHC	0.105	<0.050	<0.050
Benzo(a)pyrene	ug/g	0.3	3.6	15.4 DLHC	27.6 DLHC	0.079	<0.050	<0.050
Benzo(b)fluoranthene	ug/g	0.96	36	11.8	22.4 DLHC	0.081	<0.050	<0.050
Benzo(g,h,i)perylene	ug/g	9.6	360	7.33	8.96	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	ug/g	0.96	36	12.1	21.6 DLHC	0.067	<0.050	<0.050
Chrysene	ug/g	9.6	360	15.7 DLHC	32.9 DLHC	0.102	<0.050	<0.050
Dibenzo(ah)anthracene	ug/g	0.1	3.6	2.43	3.70	<0.050	<0.050	<0.050
Fluoranthene	ug/g	9.6	360	37.5 DLHC	95.9 DLHC	0.232	<0.050	<0.050
Fluorene	ug/g	62	62	4.22	29.7 DLHC	0.053	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	ug/g	0.76	36	7.09 DLM	11.1 DLHC	<0.050	<0.050	<0.050
1+2-Methylnaphthalenes	ug/g	76	76	1.38	12.6	<0.042	<0.042	<0.042
1-Methylnaphthalene	ug/g	76	76	0.717	10.1	<0.030	<0.030	<0.030
2-Methylnaphthalene	ug/g	76	76	0.660	2.46	<0.030	<0.030	<0.030
Naphthalene	ug/g	9.6	200	5.68	6.25	0.052	0.018	<0.013
Phenanthrene	ug/g	12	270	16.9 DLHC	115 DLHC	0.235	<0.046	<0.046
Pyrene	ug/g	96	2600	31.7 DLHC	76.0 DLHC	0.187	<0.050	<0.050
Surrogate: 2-Fluorobiphenyl	%	-	-	86.6	89.3	88.2	90.4	88.7
Surrogate: p-Terphenyl d14	%	-	-	111.2	113.3	95.5	97.5	92.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polychlorinated Biphenyls - SOIL

			Lab ID	L2157468-5
			Sample Date	31-AUG-18
			Sample ID	BH18-08-2
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Aroclor 1242	ug/g	-	-	<0.030 DLM
Aroclor 1248	ug/g	-	-	<0.010
Aroclor 1254	ug/g	-	-	<0.150 DLM
Aroclor 1260	ug/g	-	-	0.588 PRAR
Total PCBs	ug/g	1.1	4.1	0.588 DLM
Surrogate: d14-Terphenyl	%	-	-	90.0

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L2157468-1	Soil	Note: Volatile test was conducted on sample with headspace. Results may be biased low. RRR-LOR raised due to suspected contamination. Sample is from a jar.	

Qualifiers for Individual Parameters Listed:

Qualifier	Description
PRAR	PCB Pattern Most Closely Resembles Aroclor Reported
VOCJ	Soil jar was submitted as VOC sample container. VOC results may be biased low, and do not meet federal (CCME) or provincial requirements (for BC, AB-Tier1, MB, ON, SK).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
RRR	Refer to Report Remarks for issues regarding this analysis

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated	CCME CWS-PHC, Pub #1310, Dec 2001-S

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		Parameters	

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270
PCB-511-WT	Soil	PCB-O.Reg 153/04 (July 2011)	SW846 3510/8082
PH-WT	Soil	pH	MOEE E3137A
SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C
VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4215066								
WG2872328-5 MS		**L2161013-1**						
1,1-Dichloroethane			110.9		%		50-140	13-SEP-18
1,1-Dichloroethylene			98.0		%		50-140	13-SEP-18
1,2-Dibromoethane			98.2		%		50-140	13-SEP-18
1,2-Dichlorobenzene			115.4		%		50-140	13-SEP-18
1,2-Dichloroethane			97.3		%		50-140	13-SEP-18
1,2-Dichloropropane			108.0		%		50-140	13-SEP-18
1,3-Dichlorobenzene			118.3		%		50-140	13-SEP-18
1,4-Dichlorobenzene			118.6		%		50-140	13-SEP-18
Acetone			102.9		%		50-140	13-SEP-18
Benzene			114.8		%		50-140	13-SEP-18
Bromodichloromethane			106.2		%		50-140	13-SEP-18
Bromoform			97.9		%		50-140	13-SEP-18
Bromomethane			82.6		%		50-140	13-SEP-18
Carbon tetrachloride			112.9		%		50-140	13-SEP-18
Chlorobenzene			110.3		%		50-140	13-SEP-18
Chloroform			110.8		%		50-140	13-SEP-18
cis-1,2-Dichloroethylene			109.0		%		50-140	13-SEP-18
cis-1,3-Dichloropropene			102.2		%		50-140	13-SEP-18
Dibromochloromethane			103.6		%		50-140	13-SEP-18
Dichlorodifluoromethane			84.0		%		50-140	13-SEP-18
Ethylbenzene			103.2		%		50-140	13-SEP-18
n-Hexane			132.2		%		50-140	13-SEP-18
Methylene Chloride			109.9		%		50-140	13-SEP-18
MTBE			108.3		%		50-140	13-SEP-18
m+p-Xylenes			110.2		%		50-140	13-SEP-18
Methyl Ethyl Ketone			96.6		%		50-140	13-SEP-18
Methyl Isobutyl Ketone			81.7		%		50-140	13-SEP-18
o-Xylene			99.2		%		50-140	13-SEP-18
Styrene			98.9		%		50-140	13-SEP-18
Tetrachloroethylene			111.8		%		50-140	13-SEP-18
Toluene			101.7		%		50-140	13-SEP-18
trans-1,2-Dichloroethylene			107.8		%		50-140	13-SEP-18
trans-1,3-Dichloropropene			86.0		%		50-140	13-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4215066								
WG2872328-5 MS		**L2161013-1**						
Trichloroethylene			116.9		%		50-140	13-SEP-18
Trichlorofluoromethane			113.7		%		50-140	13-SEP-18
Vinyl chloride			96.5		%		50-140	13-SEP-18

Quality Control Report

Workorder: L2161122 Report Date: 14-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

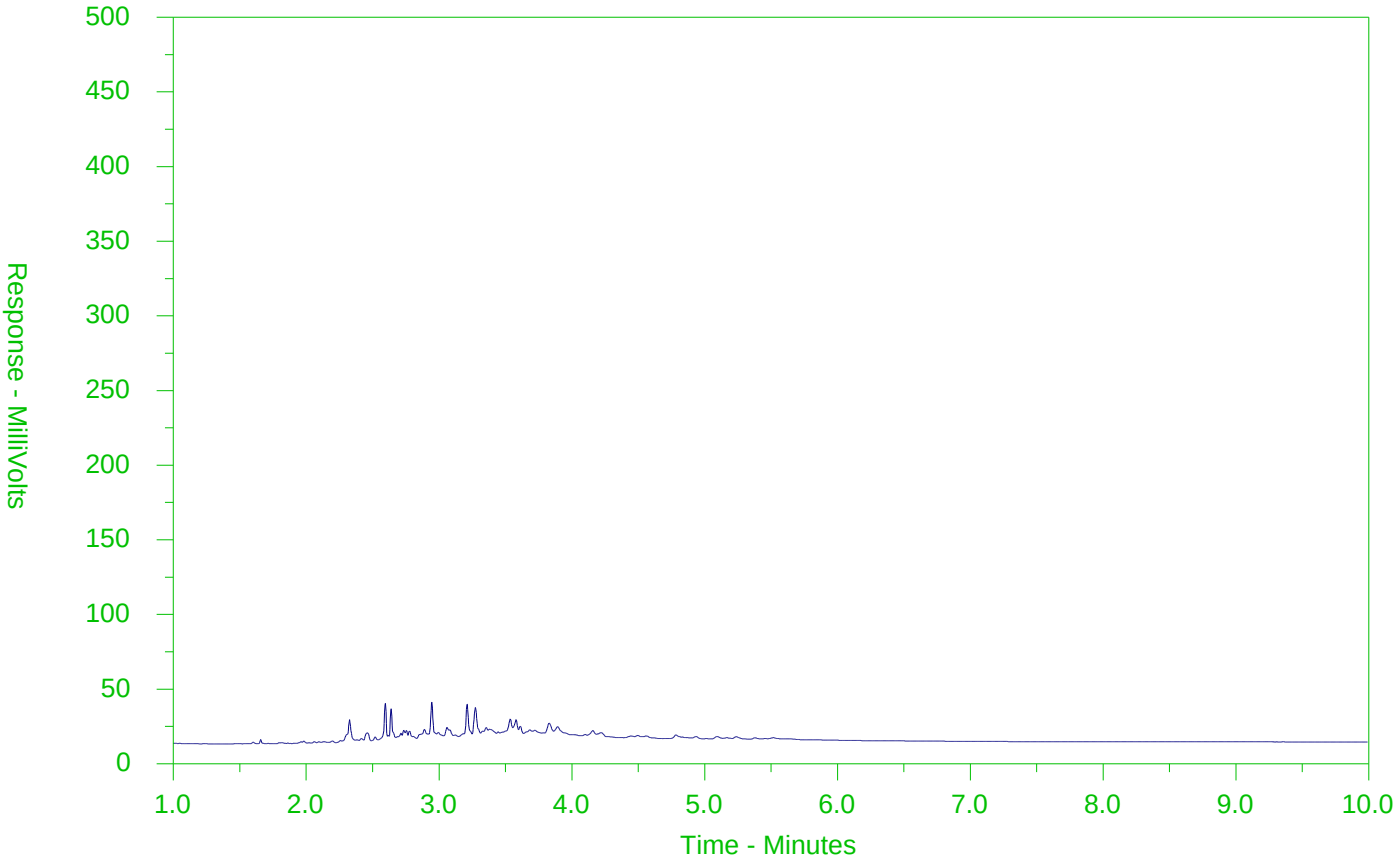
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2161122-5
Client Sample ID: BH18-23-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

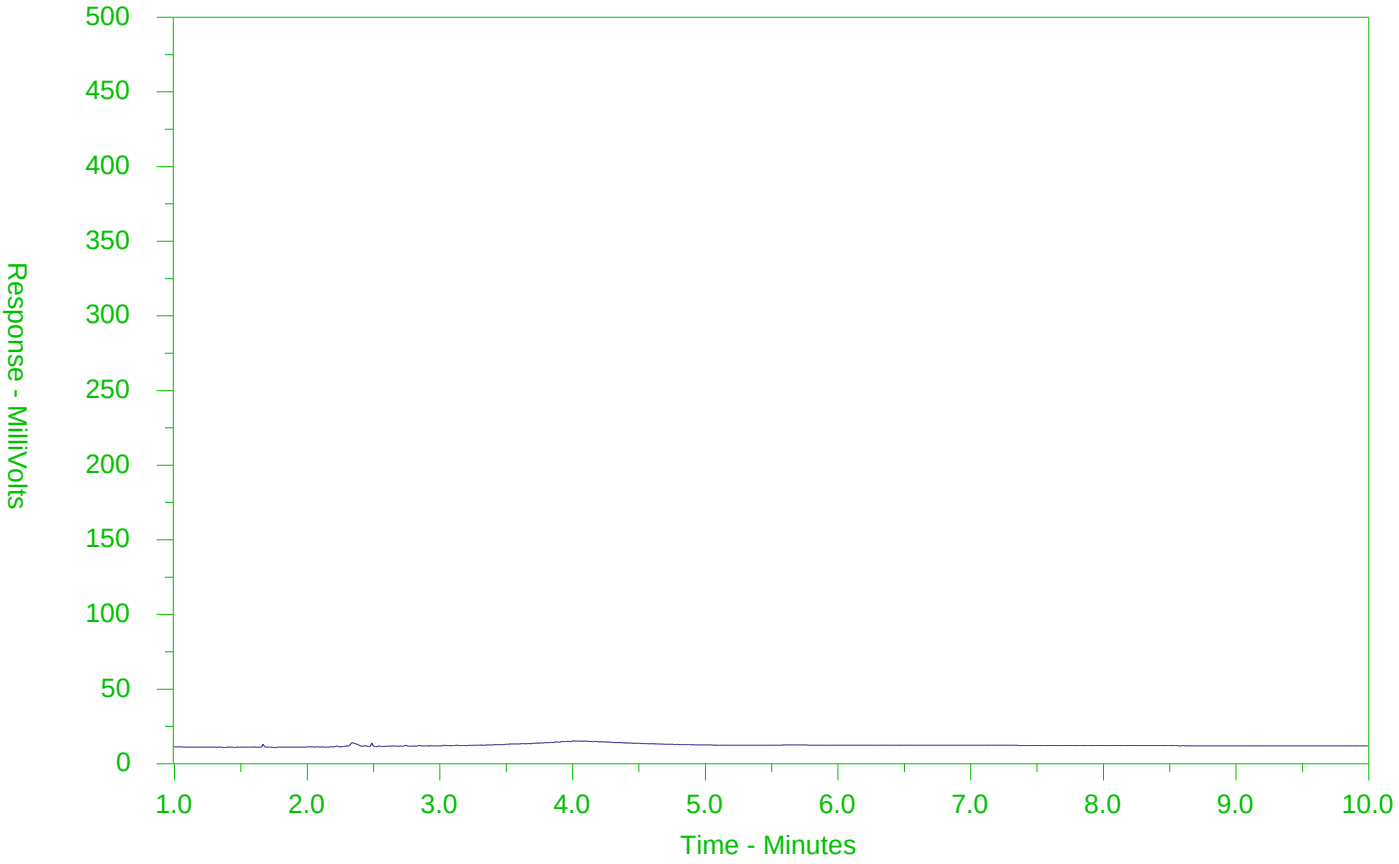
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2161122-8
Client Sample ID: BH18-23-8



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: Leon Burger
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 14-SEP-18
Report Date: 20-SEP-18 15:06 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2165096

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 17-616465
Legal Site Desc:

Mathy Mahadeva
Account Manager

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ANALYTICAL REPORT

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit

Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)

(No parameter exceedances)

Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

(No parameter exceedances)

ANALYTICAL REPORT

Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2165096-1 Sample Date: 13-SEP-18 Sample ID: BH18-26-188
% Moisture	%	-	-	20.3

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

			Lab ID	L2165096-1
			Sample Date	13-SEP-18
			Sample ID	BH18-26-188
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Benzene	ug/g	0.32	6.1	<0.0068
Ethylbenzene	ug/g	9.5	17	<0.018
Toluene	ug/g	68	68	<0.080
o-Xylene	ug/g	-	-	<0.020
m+p-Xylenes	ug/g	-	-	<0.030
Xylenes (Total)	ug/g	26	26	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	90.9
Surrogate: 1,4-Difluorobenzene	%	-	-	95.9

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Hydrocarbons - SOIL

			Lab ID	L2165096-1
			Sample Date	13-SEP-18
			Sample ID	BH18-26-188
Analyte	**Unit**	**Guide Limits #1**	**#2**	
F1 (C6-C10)	ug/g	55	55	<5.0
F1-BTEX	ug/g	55	55	<5.0
F2 (C10-C16)	ug/g	230	230	15
F3 (C16-C34)	ug/g	1700	5800	<50
F4 (C34-C50)	ug/g	3300	6900	<50
Total Hydrocarbons (C6-C50)	ug/g	-	-	<72
Chrom. to baseline at nC50		-	-	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-	98.2
Surrogate: 3,4-Dichlorotoluene	%	-	-	113.2

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

17-616465

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2165096 Report Date: 20-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: Leon Burger

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R4222770								
WG2878335-4 DUP		**WG2878335-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-SEP-18
WG2878335-2 LCS								
Benzene			103.9		%		70-130	19-SEP-18
Ethylbenzene			107.0		%		70-130	19-SEP-18
m+p-Xylenes			102.5		%		70-130	19-SEP-18
o-Xylene			107.8		%		70-130	19-SEP-18
Toluene			104.9		%		70-130	19-SEP-18
WG2878335-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	19-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	19-SEP-18
o-Xylene			<0.020		ug/g		0.02	19-SEP-18
Toluene			<0.080		ug/g		0.08	19-SEP-18
Surrogate: 1,4-Difluorobenzene			99.8		%		50-140	19-SEP-18
Surrogate: 4-Bromofluorobenzene			96.5		%		50-140	19-SEP-18
WG2878335-5 MS		**L2165052-2**						
Benzene			124.6		%		60-140	19-SEP-18
Ethylbenzene			126.0		%		60-140	19-SEP-18
m+p-Xylenes			123.1		%		60-140	19-SEP-18
o-Xylene			128.6		%		60-140	19-SEP-18
Toluene			126.4		%		60-140	19-SEP-18
F1-HS-511-WT	**Soil**							
Batch R4222770								
WG2878335-4 DUP		**WG2878335-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-SEP-18
WG2878335-2 LCS								
F1 (C6-C10)			100.7		%		80-120	19-SEP-18
WG2878335-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	20-SEP-18
Surrogate: 3,4-Dichlorotoluene			126.5		%		60-140	20-SEP-18
WG2878335-6 MS		**L2165063-2**						

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: Leon Burger

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R4222770								
WG2878335-6 MS		**L2165063-2**						
F1 (C6-C10)			111.1		%		60-140	20-SEP-18
F2-F4-511-WT	**Soil**							
Batch R4223511								
WG2878574-4 DUP		**WG2878574-3**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	18-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	18-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	18-SEP-18
WG2878574-2 LCS								
F2 (C10-C16)			97.6		%		80-120	18-SEP-18
F3 (C16-C34)			97.3		%		80-120	18-SEP-18
F4 (C34-C50)			111.4		%		80-120	18-SEP-18
WG2878574-1 MB								
F2 (C10-C16)			<10		ug/g		10	18-SEP-18
F3 (C16-C34)			<50		ug/g		50	18-SEP-18
F4 (C34-C50)			<50		ug/g		50	18-SEP-18
Surrogate: 2-Bromobenzotrifluoride			83.4		%		60-140	18-SEP-18
WG2878574-5 MS		**WG2878574-3**						
F2 (C10-C16)			106.2		%		60-140	18-SEP-18
F3 (C16-C34)			104.3		%		60-140	18-SEP-18
F4 (C34-C50)			116.1		%		60-140	18-SEP-18
MOISTURE-WT	**Soil**							
Batch R4225607								
WG2880584-3 DUP		**L2165191-1**						
% Moisture		12.2	12.6		%	3.3	20	20-SEP-18
WG2880584-2 LCS								
% Moisture			98.9		%		90-110	20-SEP-18
WG2880584-1 MB								
% Moisture			<0.10		%		0.1	20-SEP-18

Quality Control Report

Workorder: L2165096 Report Date: 20-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: Leon Burger

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

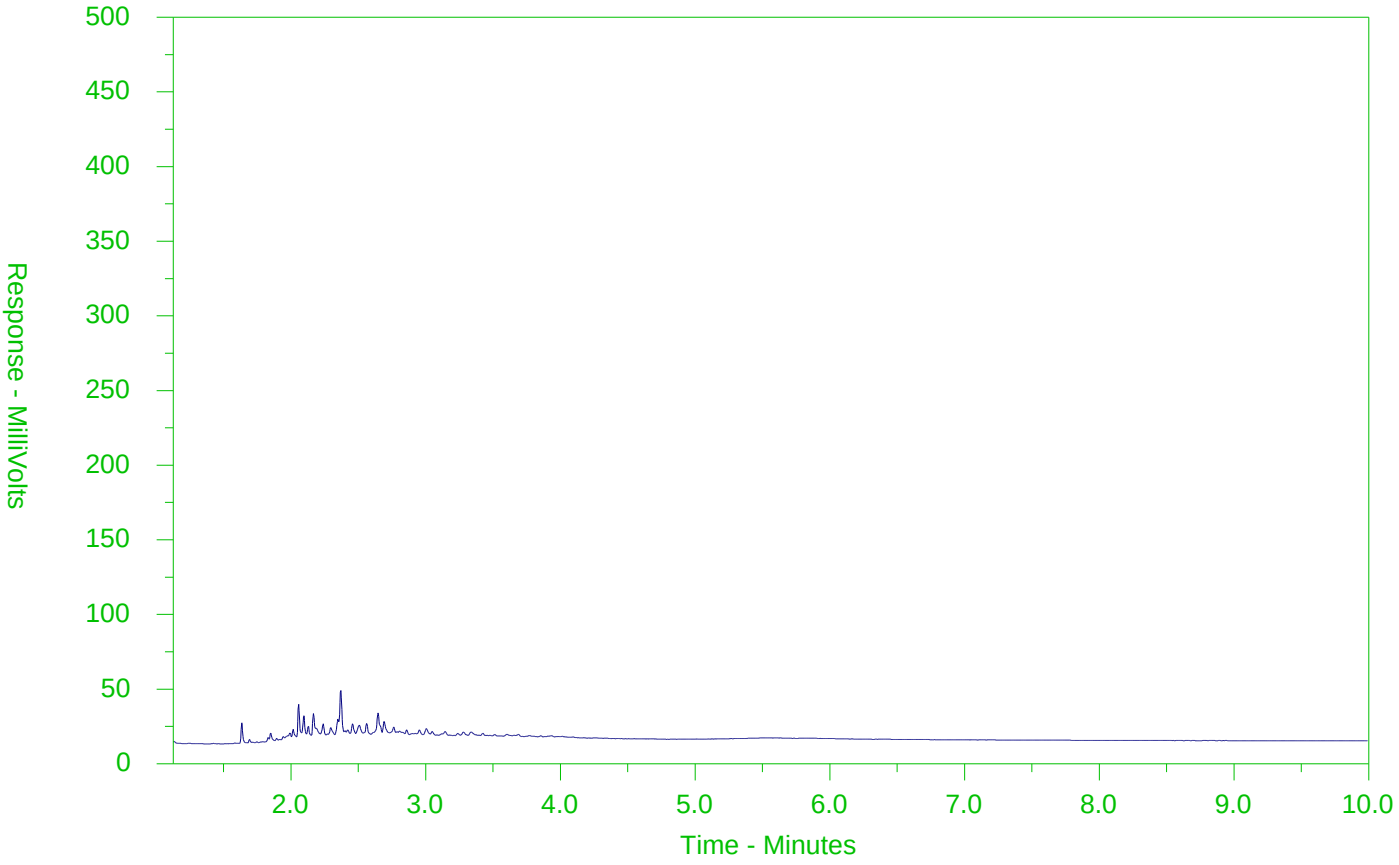
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165096-1
Client Sample ID: BH18-26-188



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2165096-COFC

COC Number: 17 - 616465

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format /		Turnaround Time (TAT) Requested - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	SNC Lavalin	Select Report Format:	PDF EXCEL EDD (DIGITAL)	Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Leon Burger	Quality Control (QC) Report with Report	YES NO	PRIORITY (Business Days): 4 day [P4-20%] / 3 day [P3-25%] / 2 day [P2-50%]
Phone:	647-355-2429	Compare Results to Criteria on Report - provide details below if box checked		EMERGENCY: 1 Business day [E-100%] / Same Day, Weekend or Statutory holiday [E2-200%] (Laboratory opening fees may apply)]
	Company address below will appear on the final report	Select Distribution:	EMAIL MAIL FAX	
Street:	1005 Skyview Dr.	Email 1 or Fax	leon.burger@snclavalin.com	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
City/Province:	Burlington, ON	Email 2		For tests that can not be performed according to the service level selected, you will be contacted.
Postal Code:		Email 3		

Invoice To		Invoice Distribution	
	Same as Report To YES NO	Select Invoice Distribution:	EMAIL MAIL FAX
	Copy of Invoice with Report YES NO	Email 1 or Fax	payables@snclavalin.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	655184	Major/Minor Code:	Routing Code:
PO / AFE:	11572	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2165096 | ALS Contact: MM | Sampler: Ariel/BK

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	PHC/BTEX	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	BH18-26-188	13-Sept-18	11:10am	Soil	✓			3

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? YES NO	O. Reg. 153 Tables 3+5
Are samples for human consumption/ use? YES NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen		SIF Observations	Yes		No	
Ice Packs	Ice Cubes	Custody seal intact	Yes		No	
Cooling Initiated						

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				3.0			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Ariel Barr-Keating	13-Sept-18	12:00 noon				AP	14-9-18	15:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 14-SEP-18
Report Date: 24-SEP-18 10:38 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2165098

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 17-616458
Legal Site Desc:

Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Regulation 153/04 - April 15, 2011 Standards - T3-Soil-Ind/Com/Commu. Property Use (Coarse)						
L2165098-5	BH18-25-8	Volatile Organic Compounds	Benzene	0.438	0.32	ug/g
		Hydrocarbons	F2 (C10-C16)	699	230	ug/g
			F3 (C16-C34)	3910	1700	ug/g
L2165098-6	BH18-25-12	Polycyclic Aromatic Hydrocarbons	Acenaphthylene	2.53	0.15	ug/g
			Anthracene	18.3	0.67	ug/g
			Benzo(a)anthracene	29.2	0.96	ug/g
			Benzo(a)pyrene	24.7	0.3	ug/g
			Benzo(b)fluoranthene	20.9	0.96	ug/g
			Benzo(g,h,i)perylene	13.2	9.6	ug/g
			Benzo(k)fluoranthene	15.6	0.96	ug/g
			Chrysene	25.5	9.6	ug/g
			Dibenzo(ah)anthracene	4.47	0.1	ug/g
			Fluoranthene	64.6	9.6	ug/g
			Indeno(1,2,3-cd)pyrene	9.92	0.76	ug/g
			Naphthalene	20.1	9.6	ug/g
			Phenanthrene	65.3	12	ug/g
L2165098-7	BH18-25-13	Metals	Lead (Pb)	234	120	ug/g
L2165098-9	BH18-25-18	Polycyclic Aromatic Hydrocarbons	Naphthalene	29.8	9.6	ug/g
L2165098-10	BH18-26-4	Volatile Organic Compounds	Benzene	1.58	0.32	ug/g
		Hydrocarbons	F2 (C10-C16)	814	230	ug/g
			F3 (C16-C34)	3590	1700	ug/g
L2165098-11	BH18-26-14	Polycyclic Aromatic Hydrocarbons	Anthracene	1.02	0.67	ug/g
			Benzo(a)pyrene	0.374	0.3	ug/g
Ontario Regulation 153/04 - April 15, 2011 Standards - T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)						
L2165098-5	BH18-25-8	Hydrocarbons	F2 (C10-C16)	699	230	ug/g
L2165098-6	BH18-25-12	Polycyclic Aromatic Hydrocarbons	Acenaphthylene	2.53	0.15	ug/g
			Anthracene	18.3	0.67	ug/g
			Benzo(a)pyrene	24.7	3.6	ug/g
			Dibenzo(ah)anthracene	4.47	3.6	ug/g
L2165098-10	BH18-26-4	Hydrocarbons	F2 (C10-C16)	814	230	ug/g
L2165098-11	BH18-26-14	Polycyclic Aromatic Hydrocarbons	Anthracene	1.02	0.67	ug/g

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

		Guide Limits									
Lab ID				L2165098-1	L2165098-2	L2165098-3	L2165098-5	L2165098-6	L2165098-7	L2165098-8	L2165098-9	L2165098-10
Sample Date				12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18
Sample ID				BH18-24-6	BH18-24-7	BH18-24-12	BH18-25-8	BH18-25-12	BH18-25-13	BH18-25-17	BH18-25-18	BH18-26-4
Analyte	**Unit**	**#1**	**#2**									
Conductivity	mS/cm	1.4	-						0.969			
% Moisture	%	-	-	17.3	22.1	18.7	37.7	32.7	20.4	18.9	19.6	19.8
pH	pH units	-	-						7.92			

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - SOIL

		Guide Limits			
Lab ID				L2165098-11	L2165098-12
Sample Date				13-SEP-18	13-SEP-18
Sample ID				BH18-26-14	BH18-26-18
Analyte	**Unit**	**#1**	**#2**		
Conductivity	mS/cm	1.4	-		0.354
% Moisture	%	-	-	17.3	22.2
pH	pH units	-	-		8.20

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - SOIL

		Guide Limits			
				Lab ID	L2165098-7	L2165098-12
				Sample Date	12-SEP-18	13-SEP-18
				Sample ID	BH18-25-13	BH18-26-18
Analyte	Unit	#1	#2		
Cyanide, Weak Acid Diss	ug/g	0.051	0.051	<0.050	<0.050

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Saturated Paste Extractables - SOIL

		Guide Limits			
Lab ID				L2165098-7	L2165098-12
Sample Date				12-SEP-18	13-SEP-18
Sample ID				BH18-25-13	BH18-26-18
Analyte	**Unit**	**#1**	**#2**		
SAR	SAR	12	-	4.27	2.23
Calcium (Ca)	mg/L	-	-	39.7	8.1
Magnesium (Mg)	mg/L	-	-	7.7	3.5
Sodium (Na)	mg/L	-	-	112	30.2

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2165098-1	L2165098-3	L2165098-4	L2165098-7	L2165098-11	L2165098-12
				Sample Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18	13-SEP-18
				Sample ID	BH18-24-6	BH18-24-12	BH18-25-2	BH18-25-13	BH18-26-14	BH18-26-18
Antimony (Sb)	ug/g	40	63		<1.0	<1.0	<1.0	2.2	<1.0	<1.0
Arsenic (As)	ug/g	18	47		4.9	3.3	5.9	11.6	3.3	4.1
Barium (Ba)	ug/g	670	7700		63.1	127	90.8	42.0	53.8	114
Beryllium (Be)	ug/g	8	60		<0.50	0.66	1.05	<0.50	0.56	0.66
Boron (B)	ug/g	120	5000		7.4	12.2	30.3	7.0	9.3	11.7
Boron (B), Hot Water Ext.	ug/g	2	5000					0.48		0.85
Cadmium (Cd)	ug/g	1.9	7.9		<0.50	<0.50	0.63	<0.50	<0.50	<0.50
Chromium (Cr)	ug/g	160	11000		12.9	21.5	19.8	13.5	19.2	23.2
Cobalt (Co)	ug/g	80	2500		7.9	10.6	9.0	6.8	11.7	10.5
Copper (Cu)	ug/g	230	5600		26.3	25.6	26.0	89.4	25.4	24.3
Lead (Pb)	ug/g	120	1000		8.7	11.7	74.1	234	11.6	14.7
Mercury (Hg)	ug/g	3.9	13		0.0055	0.0111	0.0598	0.693	0.0158	0.0778
Molybdenum (Mo)	ug/g	40	1200		<1.0	<1.0	1.1	1.9	<1.0	<1.0
Nickel (Ni)	ug/g	270	510		15.4	23.2	22.1	14.9	23.7	23.6
Selenium (Se)	ug/g	5.5	1200		<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Silver (Ag)	ug/g	40	490		<0.20	<0.20	<0.20	0.31	<0.20	<0.20
Thallium (Tl)	ug/g	3.3	33		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	33	300		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	160		24.7	31.6	24.6	29.1	27.5	32.5
Zinc (Zn)	ug/g	340	15000		37.9	54.1	226	304	54.9	54.2

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Speciated Metals - SOIL

		Guide Limits			
Lab ID				L2165098-7	L2165098-12
Sample Date				12-SEP-18	13-SEP-18
Sample ID				BH18-25-13	BH18-26-18
Analyte	**Unit**	**#1**	**#2**		
Chromium, Hexavalent	ug/g	8	40	<0.20	<0.20

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID				
				L2165098-2	L2165098-3	L2165098-5	L2165098-8	L2165098-10	L2165098-12	
				12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18	13-SEP-18	
				BH18-24-7	BH18-24-12	BH18-25-8	BH18-25-17	BH18-26-4	BH18-26-18	
Acetone	ug/g	16	16	<0.50	<0.50	<0.50	<0.50	<0.50		
Benzene	ug/g	0.32	6.1	<0.0068	<0.0068	0.438	0.242	1.58	<0.0095	DLQ
Bromodichloromethane	ug/g	18	50	<0.050	<0.050	<0.050	<0.050	<0.050		
Bromoform	ug/g	0.61	2	<0.050	<0.050	<0.050	<0.050	<0.050		
Bromomethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050		
Carbon tetrachloride	ug/g	0.21	0.43	<0.050	<0.050	<0.050	<0.050	<0.050		
Chlorobenzene	ug/g	2.4	2.4	<0.050	<0.050	<0.050	<0.050	<0.050		
Dibromochloromethane	ug/g	13	48	<0.050	<0.050	<0.050	<0.050	<0.050		
Chloroform	ug/g	0.47	0.85	<0.050	<0.050	<0.050	<0.050	<0.050		
1,2-Dibromoethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050		
1,2-Dichlorobenzene	ug/g	6.8	60	<0.050	<0.050	<0.050	<0.050	<0.050		
1,3-Dichlorobenzene	ug/g	9.6	59	<0.050	<0.050	<0.050	<0.050	<0.050		
1,4-Dichlorobenzene	ug/g	0.2	0.39	<0.050	<0.050	<0.050	<0.050	<0.050		
Dichlorodifluoromethane	ug/g	16	16	<0.050	<0.050	<0.050	<0.050	<0.050		
1,1-Dichloroethane	ug/g	17	120	<0.050	<0.050	<0.050	<0.050	<0.050		
1,2-Dichloroethane	ug/g	0.05	0.055	<0.050	<0.050	<0.050	<0.050	<0.050		
1,1-Dichloroethylene	ug/g	0.064	0.12	<0.050	<0.050	<0.050	<0.050	<0.050		
cis-1,2-Dichloroethylene	ug/g	55	110	<0.050	<0.050	<0.050	<0.050	<0.050		
trans-1,2-Dichloroethylene	ug/g	1.3	2.9	<0.050	<0.050	<0.050	<0.050	<0.050		
Methylene Chloride	ug/g	1.6	3	<0.050	<0.050	<0.050	<0.050	<0.050		
1,2-Dichloropropane	ug/g	0.16	0.33	<0.050	<0.050	<0.050	<0.050	<0.050		
cis-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030		
trans-1,3-Dichloropropene	ug/g	-	-	<0.030	<0.030	<0.030	<0.030	<0.030		
1,3-Dichloropropene (cis & trans)	ug/g	0.18	0.4	<0.042	<0.042	<0.042	<0.042	<0.042		
Ethylbenzene	ug/g	9.5	17	<0.018	<0.018	0.189	0.882	0.160	<0.018	
n-Hexane	ug/g	46	54	<0.050	<0.050	<0.050	<0.050	<0.050		
Methyl Ethyl Ketone	ug/g	70	150	<0.50	<0.50	<0.50	<0.50	<0.50		
Methyl Isobutyl Ketone	ug/g	31	64	<0.50	<0.50	<0.50	<0.50	<0.50		
MTBE	ug/g	11	14	<0.050	<0.050	<0.050	<0.050	<0.050		
Styrene	ug/g	34	66	<0.050	<0.050	0.097	<0.050	<0.050		

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Volatile Organic Compounds - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID					
				L2165098-2	L2165098-3	L2165098-5	L2165098-8	L2165098-10	L2165098-12
				12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18	13-SEP-18
				BH18-24-7	BH18-24-12	BH18-25-8	BH18-25-17	BH18-26-4	BH18-26-18
1,1,1,2-Tetrachloroethane	ug/g	0.087	0.24	<0.050	<0.050	<0.050	<0.050	<0.050	
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	
Tetrachloroethylene	ug/g	4.5	9.5	<0.050	<0.050	<0.050	<0.050	<0.050	
Toluene	ug/g	68	68	<0.080	<0.080	0.269	0.402	2.42	<0.080
1,1,1-Trichloroethane	ug/g	6.1	9.8	<0.050	<0.050	<0.050	<0.050	<0.050	
1,1,2-Trichloroethane	ug/g	0.05	0.068	<0.050	<0.050	<0.050	<0.050	<0.050	
Trichloroethylene	ug/g	0.91	1.8	<0.010	<0.010	<0.010	<0.010	<0.010	
Trichlorofluoromethane	ug/g	4	4	<0.050	<0.050	<0.050	<0.050	<0.050	
Vinyl chloride	ug/g	0.032	0.057	<0.020	<0.020	<0.020	<0.020	<0.020	
o-Xylene	ug/g	-	-	<0.020	<0.020	0.185	1.01	0.760	<0.020
m+p-Xylenes	ug/g	-	-	<0.030	<0.030	0.365	2.54	2.49	<0.030
Xylenes (Total)	ug/g	26	26	<0.050	<0.050	0.550	3.55	3.25	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	115.1	104.0	108.0	109.5	116.2	92.3
Surrogate: 1,4-Difluorobenzene	%	-	-	115.6	110.4	112.2	116.1	124.7	96.7

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Hydrocarbons - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	L2165098-2	L2165098-3	L2165098-5	L2165098-8	L2165098-10	L2165098-12
				Sample Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18	13-SEP-18
				Sample ID	BH18-24-7	BH18-24-12	BH18-25-8	BH18-25-17	BH18-26-4	BH18-26-18
F1 (C6-C10)	ug/g	55	55		<5.0	<5.0	<5.0	8.7	12.6	<5.0
F1-BTEX	ug/g	55	55		<5.0	<5.0	<5.0	<5.0	5.2	<5.0
F2 (C10-C16)	ug/g	230	230		<10	<10	699	113	814	<10
F2-Naphth	ug/g	-	-			<10				<10
F3 (C16-C34)	ug/g	1700	5800		<50	<50	3910	55	3590	<50
F3-PAH	ug/g	-	-			<50				<50
F4 (C34-C50)	ug/g	3300	6900		<50	<50	846	<50	295	<50
F4G-SG (GHH-Silica)	ug/g	3300	6900				2720			
Total Hydrocarbons (C6-C50)	ug/g	-	-		<72	<72	5450	177	4710	<72
Chrom. to baseline at nC50		-	-		YES	YES	NO	YES	YES	YES
Surrogate: 2-Bromobenzotrifluoride	%	-	-		91.6	91.7	81.8	95.7	94.6	97.8
Surrogate: 3,4-Dichlorotoluene	%	-	-		79.2	67.9	61.3	71.2	87.4	93.4

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - SOIL

			Lab ID	L2165098-1	L2165098-3	L2165098-6	L2165098-9	L2165098-11	L2165098-12
			Sample Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	13-SEP-18	13-SEP-18
			Sample ID	BH18-24-6	BH18-24-12	BH18-25-12	BH18-25-18	BH18-26-14	BH18-26-18
		Guide Limits							
Analyte	Unit	#1	#2						
Acenaphthene	ug/g	96	330	<0.050	<0.050	11.8	2.02	5.91	0.929
Acenaphthylene	ug/g	0.15	0.15	<0.050	<0.050	2.53	0.097	0.088	<0.050
Anthracene	ug/g	0.67	0.67	<0.050	<0.050	18.3	0.219	1.02	0.150
Benzo(a)anthracene	ug/g	0.96	36	<0.050	<0.050	29.2	0.069	0.699	0.112
Benzo(a)pyrene	ug/g	0.3	3.6	<0.050	<0.050	24.7	0.053	0.374	0.064
Benzo(b)fluoranthene	ug/g	0.96	36	<0.050	<0.050	20.9	<0.050	0.356	0.063
Benzo(g,h,i)perylene	ug/g	9.6	360	<0.050	<0.050	13.2	<0.050	0.203	<0.050
Benzo(k)fluoranthene	ug/g	0.96	36	<0.050	<0.050	15.6	<0.050	0.272	<0.050
Chrysene	ug/g	9.6	360	<0.050	<0.050	25.5	0.084	0.601	0.125
Dibenzo(ah)anthracene	ug/g	0.1	3.6	<0.050	<0.050	4.47	<0.050	0.070	<0.050
Fluoranthene	ug/g	9.6	360	<0.050	<0.050	64.6	0.341	4.27	0.594
Fluorene	ug/g	62	62	<0.050	<0.050	11.7	1.59	4.42	0.667
Indeno(1,2,3-cd)pyrene	ug/g	0.76	36	<0.050	<0.050	9.92	<0.050	0.144	<0.050
1+2-Methylnaphthalenes	ug/g	76	76	<0.042	<0.042	11.2	5.91	0.976	0.182
1-Methylnaphthalene	ug/g	76	76	<0.030	<0.030	4.86 DLM	2.00	0.891	0.182
2-Methylnaphthalene	ug/g	76	76	<0.030	<0.030	6.33 DLM	3.91	0.085	<0.030
Naphthalene	ug/g	9.6	200	<0.013	<0.013	20.1 DLM	29.8 DLHC	1.10	0.281
Phenanthrene	ug/g	12	270	<0.046	<0.046	65.3	2.07	8.55	1.18
Pyrene	ug/g	96	2600	<0.050	<0.050	55.0	0.216	2.69	0.376
Surrogate: 2-Fluorobiphenyl	%	-	-	83.9	89.1	83.3	88.5	87.0	89.4
Surrogate: p-Terphenyl d14	%	-	-	87.8	93.6	94.4	93.8	90.8	94.4

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polychlorinated Biphenyls - SOIL

			Lab ID	L2165098-1
			Sample Date	12-SEP-18
			Sample ID	BH18-24-6
		Guide Limits		
Analyte	Unit	#1	#2	
Aroclor 1242	ug/g	-	-	<0.010
Aroclor 1248	ug/g	-	-	<0.010
Aroclor 1254	ug/g	-	-	<0.010
Aroclor 1260	ug/g	-	-	<0.010
Total PCBs	ug/g	1.1	4.1	<0.020
Surrogate: d14-Terphenyl	%	-	-	85.6

Guide Limit #1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)
Guide Limit #2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT Soil F1-O.Reg 153/04 (July 2011) E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT Soil F2-F4-O.Reg 153/04 (July 2011) CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F4G-ADD-511-WT Soil F4G SG-O.Reg 153/04 (July 2011) MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-200.2-CVAA-WT Soil Mercury in Soil by CVAAS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-200.2-CCMS-WT Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PCB-511-WT	Soil	PCB-O.Reg 153/04 (July 2011)	SW846 3510/8082

An aliquot of a solid sample is extracted with a solvent, extract is cleaned up and analyzed on the GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

Chain of Custody Numbers:

17-616458

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4223010								
WG2880239-4 DUP		**L2166195-10**						
Boron (B), Hot Water Ext.		0.35	0.40		ug/g	13	30	19-SEP-18
WG2880239-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			95.2		%		70-130	19-SEP-18
WG2880239-3 LCS								
Boron (B), Hot Water Ext.			121.1		%		70-130	19-SEP-18
WG2880239-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	19-SEP-18
BTX-511-HS-WT	**Soil**							
Batch R4222770								
WG2878335-4 DUP		**WG2878335-3**						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-SEP-18
WG2878335-2 LCS								
Benzene			103.9		%		70-130	19-SEP-18
Ethylbenzene			107.0		%		70-130	19-SEP-18
m+p-Xylenes			102.5		%		70-130	19-SEP-18
o-Xylene			107.8		%		70-130	19-SEP-18
Toluene			104.9		%		70-130	19-SEP-18
WG2878335-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	19-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	19-SEP-18
o-Xylene			<0.020		ug/g		0.02	19-SEP-18
Toluene			<0.080		ug/g		0.08	19-SEP-18
Surrogate: 1,4-Difluorobenzene			99.8		%		50-140	19-SEP-18
Surrogate: 4-Bromofluorobenzene			96.5		%		50-140	19-SEP-18
WG2878335-5 MS		**L2165052-2**						
Benzene			124.6		%		60-140	19-SEP-18
Ethylbenzene			126.0		%		60-140	19-SEP-18
m+p-Xylenes			123.1		%		60-140	19-SEP-18
o-Xylene			128.6		%		60-140	19-SEP-18
Toluene			126.4		%		60-140	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-WAD-R511-WT	**Soil**							
Batch R4229874								
WG2880457-3 DUP		**L2165094-7**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	20-SEP-18
WG2880457-2 LCS								
Cyanide, Weak Acid Diss			101.5		%		80-120	20-SEP-18
WG2880457-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	20-SEP-18
WG2880457-4 MS		**L2165094-7**						
Cyanide, Weak Acid Diss			107.5		%		70-130	20-SEP-18
CR-CR6-IC-WT	**Soil**							
Batch R4225894								
WG2879582-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			98.2		%		70-130	20-SEP-18
WG2879582-3 DUP		**L2164165-6**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	20-SEP-18
WG2879582-2 LCS								
Chromium, Hexavalent			98.4		%		80-120	20-SEP-18
WG2879582-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	20-SEP-18
EC-WT	**Soil**							
Batch R4223571								
WG2880067-4 DUP		**WG2880067-3**						
Conductivity		0.354	0.353		mS/cm	0.3	20	19-SEP-18
WG2880067-2 IRM		**WT SAR2**						
Conductivity			88.6		%		70-130	19-SEP-18
WG2880313-1 LCS								
Conductivity			100.1		%		90-110	19-SEP-18
WG2880067-1 MB								
Conductivity			<0.0040		mS/cm		0.004	19-SEP-18
Batch R4223828								
WG2880249-4 DUP		**WG2880249-3**						
Conductivity		0.387	0.361		mS/cm	7.0	20	19-SEP-18
WG2880249-2 IRM		**WT SAR2**						
Conductivity			82.4		%		70-130	19-SEP-18
WG2880314-1 LCS								
Conductivity			98.9		%		90-110	19-SEP-18
WG2880249-1 MB								
Conductivity			<0.0040		mS/cm		0.004	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Soil**							
Batch R4222468								
WG2878629-4 DUP		**WG2878629-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-SEP-18
WG2878629-2 LCS								
F1 (C6-C10)			89.9		%		80-120	19-SEP-18
WG2878629-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	19-SEP-18
Surrogate: 3,4-Dichlorotoluene			83.5		%		60-140	19-SEP-18
WG2878629-6 MS		**L2165071-1**						
F1 (C6-C10)			89.2		%		60-140	19-SEP-18
Batch R4222770								
WG2878335-4 DUP		**WG2878335-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-SEP-18
WG2878335-2 LCS								
F1 (C6-C10)			100.7		%		80-120	19-SEP-18
WG2878335-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	20-SEP-18
Surrogate: 3,4-Dichlorotoluene			126.5		%		60-140	20-SEP-18
WG2878335-6 MS		**L2165063-2**						
F1 (C6-C10)			111.1		%		60-140	20-SEP-18
F2-F4-511-WT	**Soil**							
Batch R4223511								
WG2878574-4 DUP		**WG2878574-3**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	18-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	18-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	18-SEP-18
WG2878574-2 LCS								
F2 (C10-C16)			97.6		%		80-120	18-SEP-18
F3 (C16-C34)			97.3		%		80-120	18-SEP-18
F4 (C34-C50)			111.4		%		80-120	18-SEP-18
WG2878574-1 MB								
F2 (C10-C16)			<10		ug/g		10	18-SEP-18
F3 (C16-C34)			<50		ug/g		50	18-SEP-18
F4 (C34-C50)			<50		ug/g		50	18-SEP-18
Surrogate: 2-Bromobenzotrifluoride			83.4		%		60-140	18-SEP-18
WG2878574-5 MS		**WG2878574-3**						
F2 (C10-C16)			106.2		%		60-140	18-SEP-18
F3 (C16-C34)			104.3		%		60-140	18-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4223511								
WG2878574-5 MS		**WG2878574-3**						
F4 (C34-C50)			116.1		%		60-140	18-SEP-18
F4G-ADD-511-WT	**Soil**							
Batch R4225068								
WG2881248-2 LCS								
F4G-SG (GHH-Silica)			99.0		%		60-140	18-SEP-18
WG2881248-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	18-SEP-18
HG-200.2-CVAA-WT	**Soil**							
Batch R4222754								
WG2880213-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			99.2		%		70-130	19-SEP-18
WG2880213-6 DUP		**WG2880213-5**						
Mercury (Hg)		0.0110	0.0097		ug/g	13	40	19-SEP-18
WG2880213-3 LCS								
Mercury (Hg)			106.0		%		80-120	19-SEP-18
WG2880213-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	19-SEP-18
Batch R4227147								
WG2880000-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			99.1		%		70-130	20-SEP-18
WG2880000-6 DUP		**WG2880000-5**						
Mercury (Hg)		0.0328	0.0346		ug/g	5.2	40	20-SEP-18
WG2880000-3 LCS								
Mercury (Hg)			104.0		%		80-120	20-SEP-18
WG2880000-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	20-SEP-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4226533								
WG2880213-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			114.7		%		70-130	19-SEP-18
Arsenic (As)			112.2		%		70-130	19-SEP-18
Barium (Ba)			106.5		%		70-130	19-SEP-18
Beryllium (Be)			119.6		%		70-130	19-SEP-18
Boron (B)			3.6		mg/kg		0-8.2	19-SEP-18
Cadmium (Cd)			117.6		%		70-130	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4226533								
WG2880213-2 CRM		**WT-CANMET-TILL1**						
Chromium (Cr)			110.5		%		70-130	19-SEP-18
Cobalt (Co)			110.4		%		70-130	19-SEP-18
Copper (Cu)			111.7		%		70-130	19-SEP-18
Lead (Pb)			113.6		%		70-130	19-SEP-18
Molybdenum (Mo)			114.8		%		70-130	19-SEP-18
Nickel (Ni)			111.1		%		70-130	19-SEP-18
Selenium (Se)			0.31		mg/kg		0.11-0.51	19-SEP-18
Silver (Ag)			0.25		mg/kg		0.13-0.33	19-SEP-18
Thallium (Tl)			0.141		mg/kg		0.077-0.18	19-SEP-18
Uranium (U)			117.7		%		70-130	19-SEP-18
Vanadium (V)			112.9		%		70-130	19-SEP-18
Zinc (Zn)			112.5		%		70-130	19-SEP-18
WG2880213-6 DUP		**WG2880213-5**						
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	19-SEP-18
Arsenic (As)		1.82	1.53		ug/g	17	30	19-SEP-18
Barium (Ba)		25.5	22.7		ug/g	12	40	19-SEP-18
Beryllium (Be)		0.26	0.22		ug/g	17	30	19-SEP-18
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-SEP-18
Cadmium (Cd)		0.051	0.046		ug/g	8.6	30	19-SEP-18
Chromium (Cr)		9.52	8.58		ug/g	10	30	19-SEP-18
Cobalt (Co)		3.68	3.18		ug/g	14	30	19-SEP-18
Copper (Cu)		7.53	6.84		ug/g	9.7	30	19-SEP-18
Lead (Pb)		4.57	3.98		ug/g	14	40	19-SEP-18
Molybdenum (Mo)		0.18	0.15		ug/g	17	40	19-SEP-18
Nickel (Ni)		7.89	7.07		ug/g	11	30	19-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	19-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	19-SEP-18
Thallium (Tl)		0.070	0.056		ug/g	22	30	19-SEP-18
Uranium (U)		0.529	0.437		ug/g	19	30	19-SEP-18
Vanadium (V)		21.1	18.6		ug/g	12	30	19-SEP-18
Zinc (Zn)		19.3	17.1		ug/g	12	30	19-SEP-18
WG2880213-4 LCS								
Antimony (Sb)			112.2		%		80-120	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4226533								
WG2880213-4 LCS								
Arsenic (As)			114.1		%		80-120	19-SEP-18
Barium (Ba)			114.2		%		80-120	19-SEP-18
Beryllium (Be)			109.2		%		80-120	19-SEP-18
Boron (B)			97.9		%		80-120	19-SEP-18
Cadmium (Cd)			110.7		%		80-120	19-SEP-18
Chromium (Cr)			113.0		%		80-120	19-SEP-18
Cobalt (Co)			109.4		%		80-120	19-SEP-18
Copper (Cu)			110.4		%		80-120	19-SEP-18
Lead (Pb)			114.6		%		80-120	19-SEP-18
Molybdenum (Mo)			110.6		%		80-120	19-SEP-18
Nickel (Ni)			110.9		%		80-120	19-SEP-18
Selenium (Se)			109.4		%		80-120	19-SEP-18
Silver (Ag)			111.2		%		80-120	19-SEP-18
Thallium (Tl)			107.4		%		80-120	19-SEP-18
Uranium (U)			116.7		%		80-120	19-SEP-18
Vanadium (V)			114.7		%		80-120	19-SEP-18
Zinc (Zn)			109.9		%		80-120	19-SEP-18
WG2880213-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	19-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	19-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	19-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	19-SEP-18
Boron (B)			<5.0		mg/kg		5	19-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	19-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	19-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	19-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	19-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	19-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	19-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	19-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	19-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	19-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4226533								
WG2880213-1 MB								
Vanadium (V)			<0.20		mg/kg		0.2	19-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	19-SEP-18
Batch R4226541								
WG2880000-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			111.3		%		70-130	19-SEP-18
Arsenic (As)			110.6		%		70-130	19-SEP-18
Barium (Ba)			102.3		%		70-130	19-SEP-18
Beryllium (Be)			105.4		%		70-130	19-SEP-18
Boron (B)			2.8		mg/kg		0-8.2	19-SEP-18
Cadmium (Cd)			105.5		%		70-130	19-SEP-18
Chromium (Cr)			104.0		%		70-130	19-SEP-18
Cobalt (Co)			105.2		%		70-130	19-SEP-18
Copper (Cu)			108.7		%		70-130	19-SEP-18
Lead (Pb)			110.6		%		70-130	19-SEP-18
Molybdenum (Mo)			107.5		%		70-130	19-SEP-18
Nickel (Ni)			104.8		%		70-130	19-SEP-18
Selenium (Se)			0.34		mg/kg		0.11-0.51	19-SEP-18
Silver (Ag)			0.25		mg/kg		0.13-0.33	19-SEP-18
Thallium (Tl)			0.131		mg/kg		0.077-0.18	19-SEP-18
Uranium (U)			109.4		%		70-130	19-SEP-18
Vanadium (V)			103.5		%		70-130	19-SEP-18
Zinc (Zn)			103.6		%		70-130	19-SEP-18
WG2880000-6 DUP		**WG2880000-5**						
Antimony (Sb)		0.40	0.38		ug/g	5.5	30	19-SEP-18
Arsenic (As)		6.94	6.69		ug/g	3.7	30	19-SEP-18
Barium (Ba)		78.9	78.8		ug/g	0.1	40	19-SEP-18
Beryllium (Be)		0.89	0.89		ug/g	0.4	30	19-SEP-18
Boron (B)		17.2	17.3		ug/g	0.6	30	19-SEP-18
Cadmium (Cd)		0.105	0.111		ug/g	6.2	30	19-SEP-18
Chromium (Cr)		27.7	26.1		ug/g	6.1	30	19-SEP-18
Cobalt (Co)		14.4	13.9		ug/g	4.0	30	19-SEP-18
Copper (Cu)		32.0	30.6		ug/g	4.4	30	19-SEP-18
Lead (Pb)		14.4	14.6		ug/g	1.7	40	19-SEP-18
Molybdenum (Mo)		0.48	0.47		ug/g			19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4226541								
WG2880000-6 DUP		**WG2880000-5**						
Molybdenum (Mo)		0.48	0.47		ug/g	1.9	40	19-SEP-18
Nickel (Ni)		31.5	30.4		ug/g	3.7	30	19-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	19-SEP-18
Silver (Ag)		0.11	0.14		ug/g	25	40	19-SEP-18
Thallium (Tl)		0.122	0.119		ug/g	2.8	30	19-SEP-18
Uranium (U)		0.704	0.689		ug/g	2.2	30	19-SEP-18
Vanadium (V)		34.0	33.1		ug/g	2.9	30	19-SEP-18
Zinc (Zn)		81.9	81.6		ug/g	0.4	30	19-SEP-18
WG2880000-4 LCS								
Antimony (Sb)			111.9		%		80-120	19-SEP-18
Arsenic (As)			112.3		%		80-120	19-SEP-18
Barium (Ba)			110.0		%		80-120	19-SEP-18
Beryllium (Be)			114.3		%		80-120	19-SEP-18
Boron (B)			100.3		%		80-120	19-SEP-18
Cadmium (Cd)			110.4		%		80-120	19-SEP-18
Chromium (Cr)			110.3		%		80-120	19-SEP-18
Cobalt (Co)			106.8		%		80-120	19-SEP-18
Copper (Cu)			107.5		%		80-120	19-SEP-18
Lead (Pb)			113.2		%		80-120	19-SEP-18
Molybdenum (Mo)			114.2		%		80-120	19-SEP-18
Nickel (Ni)			107.7		%		80-120	19-SEP-18
Selenium (Se)			108.4		%		80-120	19-SEP-18
Silver (Ag)			110.2		%		80-120	19-SEP-18
Thallium (Tl)			108.1		%		80-120	19-SEP-18
Uranium (U)			116.5		%		80-120	19-SEP-18
Vanadium (V)			112.5		%		80-120	19-SEP-18
Zinc (Zn)			107.0		%		80-120	19-SEP-18
WG2880000-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	19-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	19-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	19-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	19-SEP-18
Boron (B)			<5.0		mg/kg		5	19-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4226541								
WG2880000-1 MB								
Chromium (Cr)			<0.50		mg/kg		0.5	19-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	19-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	19-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	19-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	19-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	19-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	19-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	19-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	19-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	19-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	19-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	19-SEP-18
MOISTURE-WT	**Soil**							
Batch R4218345								
WG2879128-3 DUP		**L2165066-4**						
% Moisture		4.15	4.32		%	4.0	20	19-SEP-18
WG2879128-2 LCS								
% Moisture			99.4		%		90-110	19-SEP-18
WG2879128-1 MB								
% Moisture			<0.10		%		0.1	19-SEP-18
Batch R4225607								
WG2880584-3 DUP		**L2165191-1**						
% Moisture		12.2	12.6		%	3.3	20	20-SEP-18
WG2880584-2 LCS								
% Moisture			98.9		%		90-110	20-SEP-18
WG2880584-1 MB								
% Moisture			<0.10		%		0.1	20-SEP-18
PAH-511-WT	**Soil**							
Batch R4230892								
WG2879108-8 DUP		**WG2879108-10**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	21-SEP-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	21-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4230892								
WG2879108-8 DUP		**WG2879108-10**						
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	21-SEP-18
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	21-SEP-18
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-SEP-18
WG2879108-7 LCS								
1-Methylnaphthalene			88.3		%		50-140	21-SEP-18
2-Methylnaphthalene			88.5		%		50-140	21-SEP-18
Acenaphthene			85.8		%		50-140	21-SEP-18
Acenaphthylene			81.8		%		50-140	21-SEP-18
Anthracene			87.9		%		50-140	21-SEP-18
Benzo(a)anthracene			84.5		%		50-140	21-SEP-18
Benzo(a)pyrene			84.6		%		50-140	21-SEP-18
Benzo(b)fluoranthene			87.4		%		50-140	21-SEP-18
Benzo(g,h,i)perylene			86.4		%		50-140	21-SEP-18
Benzo(k)fluoranthene			86.9		%		50-140	21-SEP-18
Chrysene			89.8		%		50-140	21-SEP-18
Dibenzo(ah)anthracene			86.1		%		50-140	21-SEP-18
Fluoranthene			83.1		%		50-140	21-SEP-18
Fluorene			80.1		%		50-140	21-SEP-18
Indeno(1,2,3-cd)pyrene			69.6		%		50-140	21-SEP-18
Naphthalene			87.3		%		50-140	21-SEP-18
Phenanthrene			89.6		%		50-140	21-SEP-18
Pyrene			84.1		%		50-140	21-SEP-18
WG2879108-6 MB								
							0.03	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4230892								
WG2879108-6 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	21-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	21-SEP-18
Acenaphthene			<0.050		ug/g		0.05	21-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	21-SEP-18
Anthracene			<0.050		ug/g		0.05	21-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	21-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	21-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	21-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	21-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	21-SEP-18
Chrysene			<0.050		ug/g		0.05	21-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	21-SEP-18
Fluoranthene			<0.050		ug/g		0.05	21-SEP-18
Fluorene			<0.050		ug/g		0.05	21-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	21-SEP-18
Naphthalene			<0.013		ug/g		0.013	21-SEP-18
Phenanthrene			<0.046		ug/g		0.046	21-SEP-18
Pyrene			<0.050		ug/g		0.05	21-SEP-18
Surrogate: 2-Fluorobiphenyl			88.8		%		50-140	21-SEP-18
Surrogate: p-Terphenyl d14			92.1		%		50-140	21-SEP-18
WG2879108-9 MS		**WG2879108-10**						
1-Methylnaphthalene			89.5		%		50-140	21-SEP-18
2-Methylnaphthalene			89.8		%		50-140	21-SEP-18
Acenaphthene			88.1		%		50-140	21-SEP-18
Acenaphthylene			82.8		%		50-140	21-SEP-18
Anthracene			91.1		%		50-140	21-SEP-18
Benzo(a)anthracene			86.3		%		50-140	21-SEP-18
Benzo(a)pyrene			85.4		%		50-140	21-SEP-18
Benzo(b)fluoranthene			86.7		%		50-140	21-SEP-18
Benzo(g,h,i)perylene			84.7		%		50-140	21-SEP-18
Benzo(k)fluoranthene			89.7		%		50-140	21-SEP-18
Chrysene			88.2		%		50-140	21-SEP-18
Dibenzo(ah)anthracene			85.3		%		50-140	21-SEP-18
Fluoranthene			82.6		%		50-140	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4230892								
WG2879108-9 MS		**WG2879108-10**						
Fluorene			82.0		%		50-140	21-SEP-18
Indeno(1,2,3-cd)pyrene			67.7		%		50-140	21-SEP-18
Naphthalene			88.2		%		50-140	21-SEP-18
Phenanthrene			89.6		%		50-140	21-SEP-18
Pyrene			83.8		%		50-140	21-SEP-18
PCB-511-WT	**Soil**							
Batch R4227273								
WG2879108-8 DUP		**WG2879108-10**						
Aroclor 1242		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-SEP-18
Aroclor 1248		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-SEP-18
Aroclor 1254		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-SEP-18
Aroclor 1260		<0.010	<0.010	RPD-NA	ug/g	N/A	40	20-SEP-18
WG2879108-7 LCS								
Aroclor 1242			101.1		%		60-140	20-SEP-18
Aroclor 1248			72.3		%		60-140	20-SEP-18
Aroclor 1254			95.9		%		60-140	20-SEP-18
Aroclor 1260			106.2		%		60-140	20-SEP-18
WG2879108-6 MB								
Aroclor 1242			<0.010		ug/g		0.01	20-SEP-18
Aroclor 1248			<0.010		ug/g		0.01	20-SEP-18
Aroclor 1254			<0.010		ug/g		0.01	20-SEP-18
Aroclor 1260			<0.010		ug/g		0.01	20-SEP-18
Surrogate: d14-Terphenyl			91.6		%		60-140	20-SEP-18
WG2879108-9 MS		**WG2879108-10**						
Aroclor 1242			98.6		%		60-140	20-SEP-18
Aroclor 1254			95.9		%		60-140	20-SEP-18
Aroclor 1260			103.8		%		60-140	20-SEP-18
PH-WT	**Soil**							
Batch R4223729								
WG2878724-1 DUP		**L2165094-17**						
pH		7.29	7.46	J	pH units	0.17	0.3	19-SEP-18
WG2880306-1 LCS								
pH			6.92		pH units		6.9-7.1	19-SEP-18
SAR-R511-WT	**Soil**							

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	**Soil**							
Batch R4226909								
WG2880067-4 DUP		**WG2880067-3**						
Calcium (Ca)		8.1	8.1		mg/L	0.6	30	19-SEP-18
Sodium (Na)		30.4	30.2		mg/L	0.6	30	19-SEP-18
Magnesium (Mg)		3.5	3.5		mg/L	0.2	30	19-SEP-18
WG2880067-2 IRM		**WT SAR2**						
Calcium (Ca)			83.4		%		70-130	19-SEP-18
Sodium (Na)			92.1		%		70-130	19-SEP-18
Magnesium (Mg)			81.5		%		70-130	19-SEP-18
WG2880067-1 MB								
Calcium (Ca)			<1.0		mg/L		1	19-SEP-18
Sodium (Na)			<1.0		mg/L		1	19-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	19-SEP-18
Batch R4226928								
WG2880249-4 DUP		**WG2880249-3**						
Calcium (Ca)		14.4	15.9		mg/L	9.8	30	19-SEP-18
Sodium (Na)		29.8	31.9		mg/L	6.6	30	19-SEP-18
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	19-SEP-18
WG2880249-2 IRM		**WT SAR2**						
Calcium (Ca)			82.4		%		70-130	19-SEP-18
Sodium (Na)			92.2		%		70-130	19-SEP-18
Magnesium (Mg)			80.8		%		70-130	19-SEP-18
WG2880249-1 MB								
Calcium (Ca)			<1.0		mg/L		1	19-SEP-18
Sodium (Na)			<1.0		mg/L		1	19-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	19-SEP-18
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-4 DUP		**WG2878629-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-4 DUP		**WG2878629-3**						
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-SEP-18
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	19-SEP-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Vinyl chloride		<0.020	<0.020		ug/g			19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-4 DUP		**WG2878629-3**						
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
WG2878629-2 LCS								
1,1,1,2-Tetrachloroethane			112.0		%		60-130	19-SEP-18
1,1,2,2-Tetrachloroethane			89.7		%		60-130	19-SEP-18
1,1,1-Trichloroethane			113.5		%		60-130	19-SEP-18
1,1,2-Trichloroethane			101.9		%		60-130	19-SEP-18
1,1-Dichloroethane			96.7		%		60-130	19-SEP-18
1,1-Dichloroethylene			95.1		%		60-130	19-SEP-18
1,2-Dibromoethane			103.5		%		70-130	19-SEP-18
1,2-Dichlorobenzene			110.2		%		70-130	19-SEP-18
1,2-Dichloroethane			110.1		%		60-130	19-SEP-18
1,2-Dichloropropane			96.3		%		70-130	19-SEP-18
1,3-Dichlorobenzene			108.8		%		70-130	19-SEP-18
1,4-Dichlorobenzene			110.1		%		70-130	19-SEP-18
Acetone			112.2		%		60-140	19-SEP-18
Benzene			101.9		%		70-130	19-SEP-18
Bromodichloromethane			109.5		%		50-140	19-SEP-18
Bromoform			109.3		%		70-130	19-SEP-18
Bromomethane			103.7		%		50-140	19-SEP-18
Carbon tetrachloride			116.4		%		70-130	19-SEP-18
Chlorobenzene			109.6		%		70-130	19-SEP-18
Chloroform			108.3		%		70-130	19-SEP-18
cis-1,2-Dichloroethylene			105.9		%		70-130	19-SEP-18
cis-1,3-Dichloropropene			104.6		%		70-130	19-SEP-18
Dibromochloromethane			109.7		%		60-130	19-SEP-18
Dichlorodifluoromethane			97.9		%		50-140	19-SEP-18
Ethylbenzene			109.0		%		70-130	19-SEP-18
n-Hexane			107.7		%		70-130	19-SEP-18
Methylene Chloride			98.0		%		70-130	19-SEP-18
MTBE			108.7		%		70-130	19-SEP-18
m+p-Xylenes			110.3		%		70-130	19-SEP-18
Methyl Ethyl Ketone			106.3		%		60-140	19-SEP-18
Methyl Isobutyl Ketone			97.8		%		60-140	19-SEP-18
o-Xylene			109.5		%		70-130	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-2 LCS								
Styrene			113.7		%		70-130	19-SEP-18
Tetrachloroethylene			114.1		%		60-130	19-SEP-18
Toluene			104.3		%		70-130	19-SEP-18
trans-1,2-Dichloroethylene			99.0		%		60-130	19-SEP-18
trans-1,3-Dichloropropene			105.5		%		70-130	19-SEP-18
Trichloroethylene			117.8		%		60-130	19-SEP-18
Trichlorofluoromethane			117.1		%		50-140	19-SEP-18
Vinyl chloride			93.1		%		60-140	19-SEP-18
WG2878629-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	19-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	19-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	19-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	19-SEP-18
1,1-Dichloroethane			<0.050		ug/g		0.05	19-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	19-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	19-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	19-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	19-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	19-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	19-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	19-SEP-18
Acetone			<0.50		ug/g		0.5	19-SEP-18
Benzene			<0.0068		ug/g		0.0068	19-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	19-SEP-18
Bromoform			<0.050		ug/g		0.05	19-SEP-18
Bromomethane			<0.050		ug/g		0.05	19-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	19-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	19-SEP-18
Chloroform			<0.050		ug/g		0.05	19-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	19-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	19-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	19-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	19-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-1 MB								
n-Hexane			<0.050		ug/g		0.05	19-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	19-SEP-18
MTBE			<0.050		ug/g		0.05	19-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	19-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	19-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	19-SEP-18
o-Xylene			<0.020		ug/g		0.02	19-SEP-18
Styrene			<0.050		ug/g		0.05	19-SEP-18
Tetrachloroethylene			<0.050		ug/g		0.05	19-SEP-18
Toluene			<0.080		ug/g		0.08	19-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	19-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	19-SEP-18
Trichloroethylene			<0.010		ug/g		0.01	19-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	19-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	19-SEP-18
Surrogate: 1,4-Difluorobenzene			122.1		%		50-140	19-SEP-18
Surrogate: 4-Bromofluorobenzene			119.1		%		50-140	19-SEP-18
WG2878629-5 MS		**L2165066-2**						
1,1,1,2-Tetrachloroethane			119.8		%		50-140	19-SEP-18
1,1,2,2-Tetrachloroethane			97.2		%		50-140	19-SEP-18
1,1,1-Trichloroethane			124.1		%		50-140	19-SEP-18
1,1,2-Trichloroethane			108.4		%		50-140	19-SEP-18
1,1-Dichloroethane			105.9		%		50-140	19-SEP-18
1,1-Dichloroethylene			102.9		%		50-140	19-SEP-18
1,2-Dibromoethane			111.3		%		50-140	19-SEP-18
1,2-Dichlorobenzene			120.1		%		50-140	19-SEP-18
1,2-Dichloroethane			121.9		%		50-140	19-SEP-18
1,2-Dichloropropane			102.6		%		50-140	19-SEP-18
1,3-Dichlorobenzene			118.3		%		50-140	19-SEP-18
1,4-Dichlorobenzene			120.1		%		50-140	19-SEP-18
Acetone			124.3		%		50-140	19-SEP-18
Benzene			110.1		%		50-140	19-SEP-18
Bromodichloromethane			120.6		%		50-140	19-SEP-18
Bromoform			118.2		%		50-140	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4222468								
WG2878629-5 MS		**L2165066-2**						
Bromomethane			109.8		%		50-140	19-SEP-18
Carbon tetrachloride			127.4		%		50-140	19-SEP-18
Chlorobenzene			117.0		%		50-140	19-SEP-18
Chloroform			118.6		%		50-140	19-SEP-18
cis-1,2-Dichloroethylene			115.4		%		50-140	19-SEP-18
cis-1,3-Dichloropropene			110.3		%		50-140	19-SEP-18
Dibromochloromethane			119.4		%		50-140	19-SEP-18
Dichlorodifluoromethane			102.8		%		50-140	19-SEP-18
Ethylbenzene			114.9		%		50-140	19-SEP-18
n-Hexane			115.5		%		50-140	19-SEP-18
Methylene Chloride			106.9		%		50-140	19-SEP-18
MTBE			115.9		%		50-140	19-SEP-18
m+p-Xylenes			117.0		%		50-140	19-SEP-18
Methyl Ethyl Ketone			114.9		%		50-140	19-SEP-18
Methyl Isobutyl Ketone			107.1		%		50-140	19-SEP-18
o-Xylene			116.3		%		50-140	19-SEP-18
Styrene			121.6		%		50-140	19-SEP-18
Tetrachloroethylene			121.0		%		50-140	19-SEP-18
Toluene			110.9		%		50-140	19-SEP-18
trans-1,2-Dichloroethylene			106.6		%		50-140	19-SEP-18
trans-1,3-Dichloropropene			108.3		%		50-140	19-SEP-18
Trichloroethylene			127.8		%		50-140	19-SEP-18
Trichlorofluoromethane			127.7		%		50-140	19-SEP-18
Vinyl chloride			99.3		%		50-140	19-SEP-18

Quality Control Report

Workorder: L2165098 Report Date: 24-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

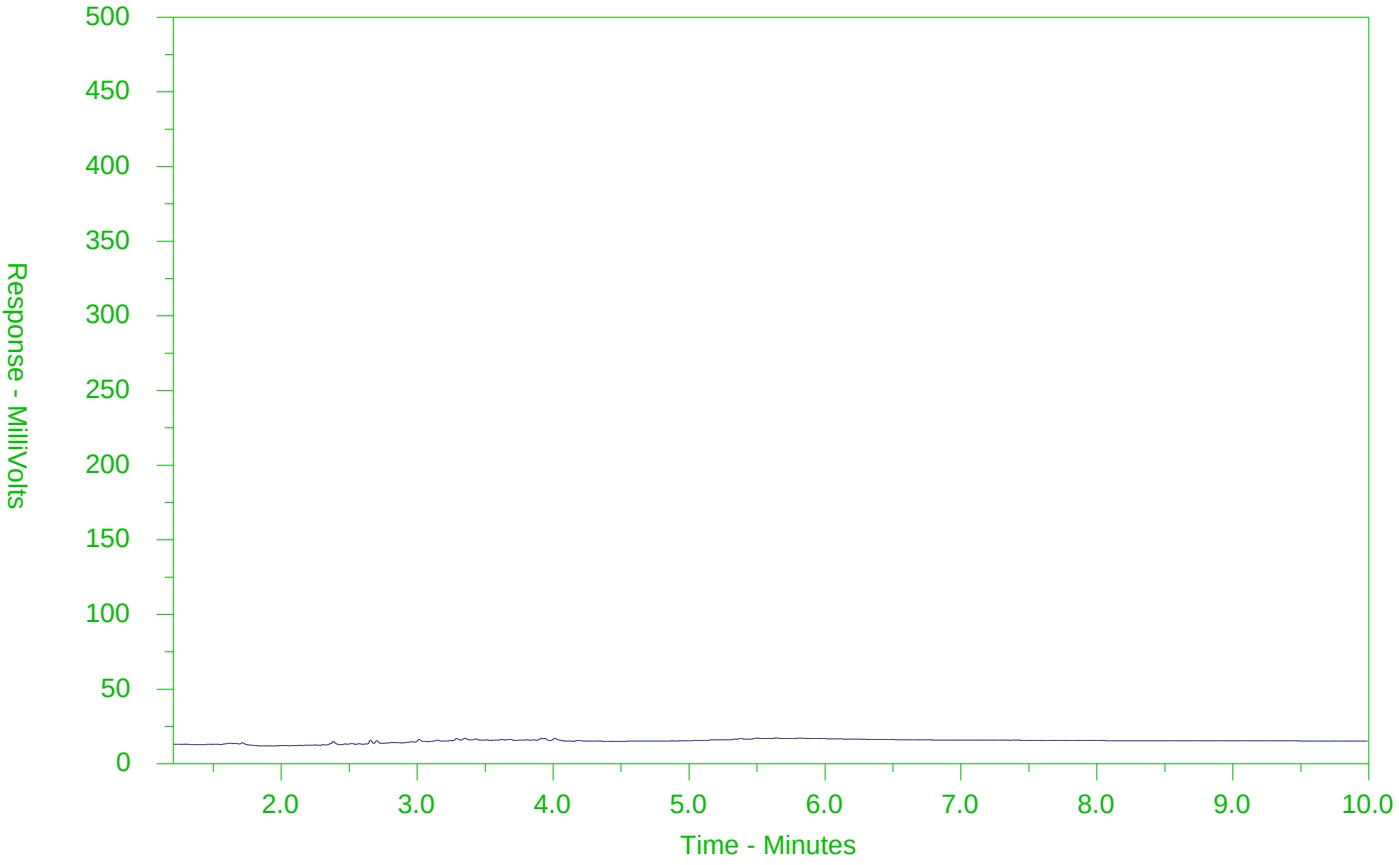
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-2
Client Sample ID: BH18-24-7



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

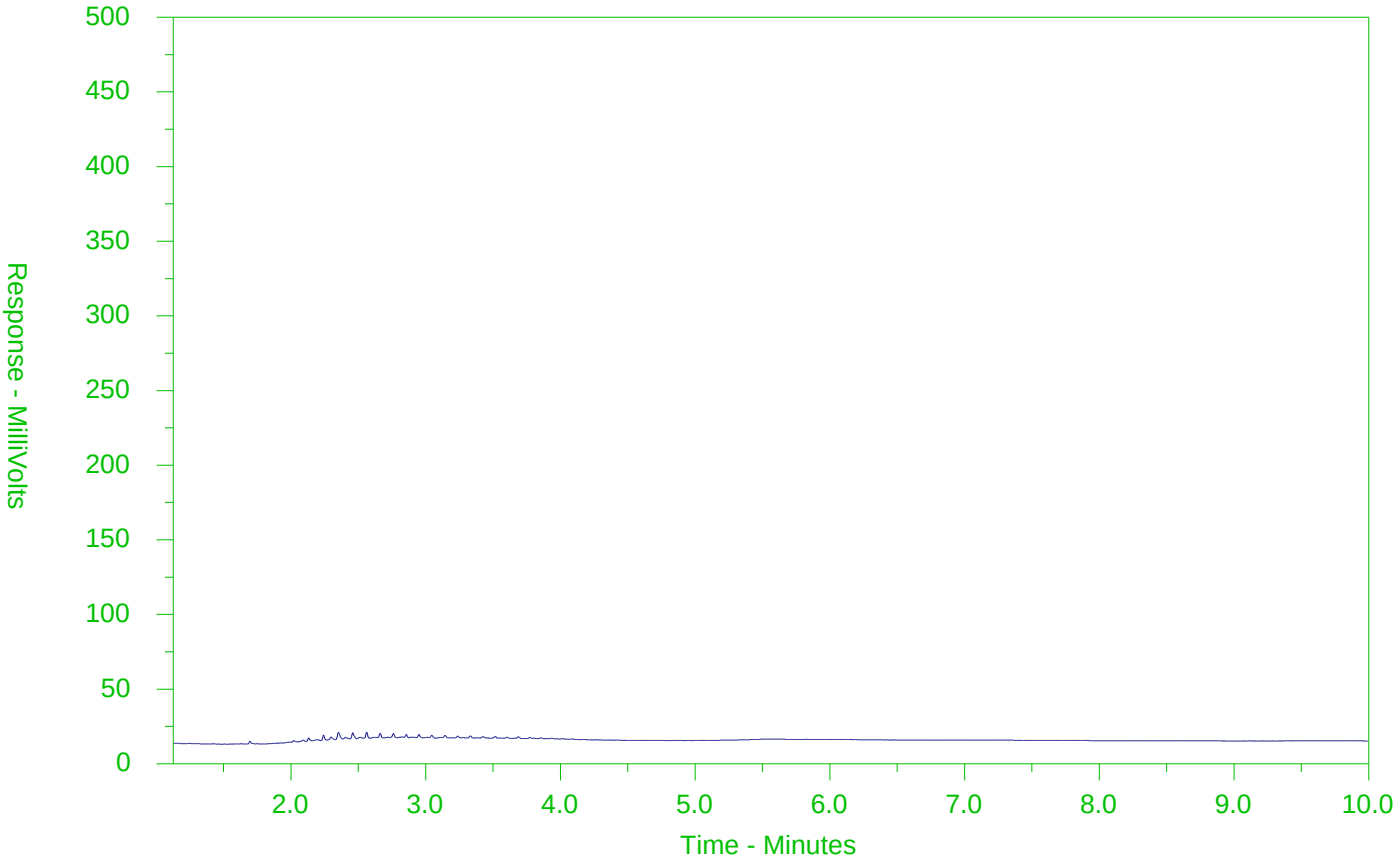
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-3
Client Sample ID: BH18-24-12



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

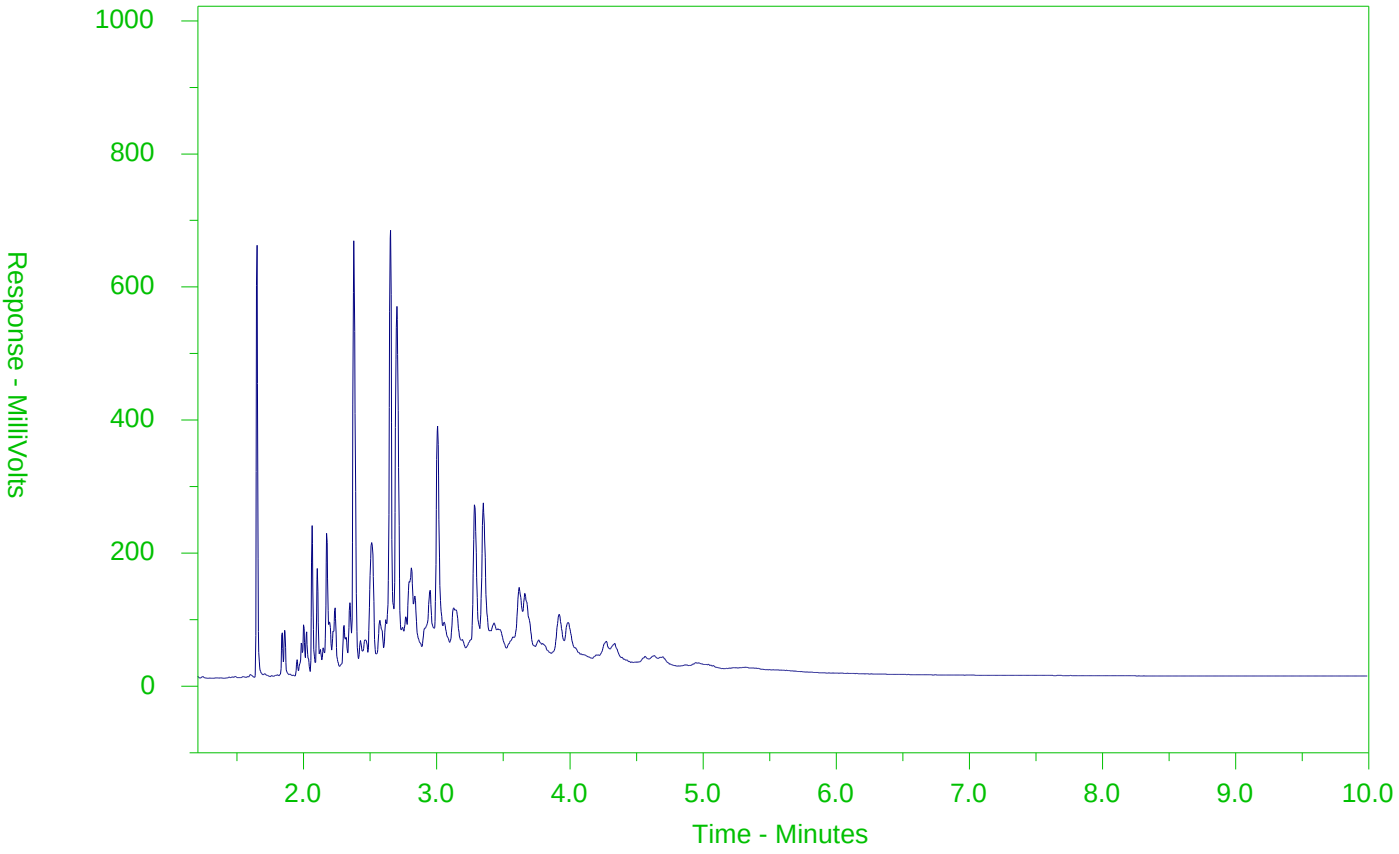
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-5
Client Sample ID: BH18-25-8



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

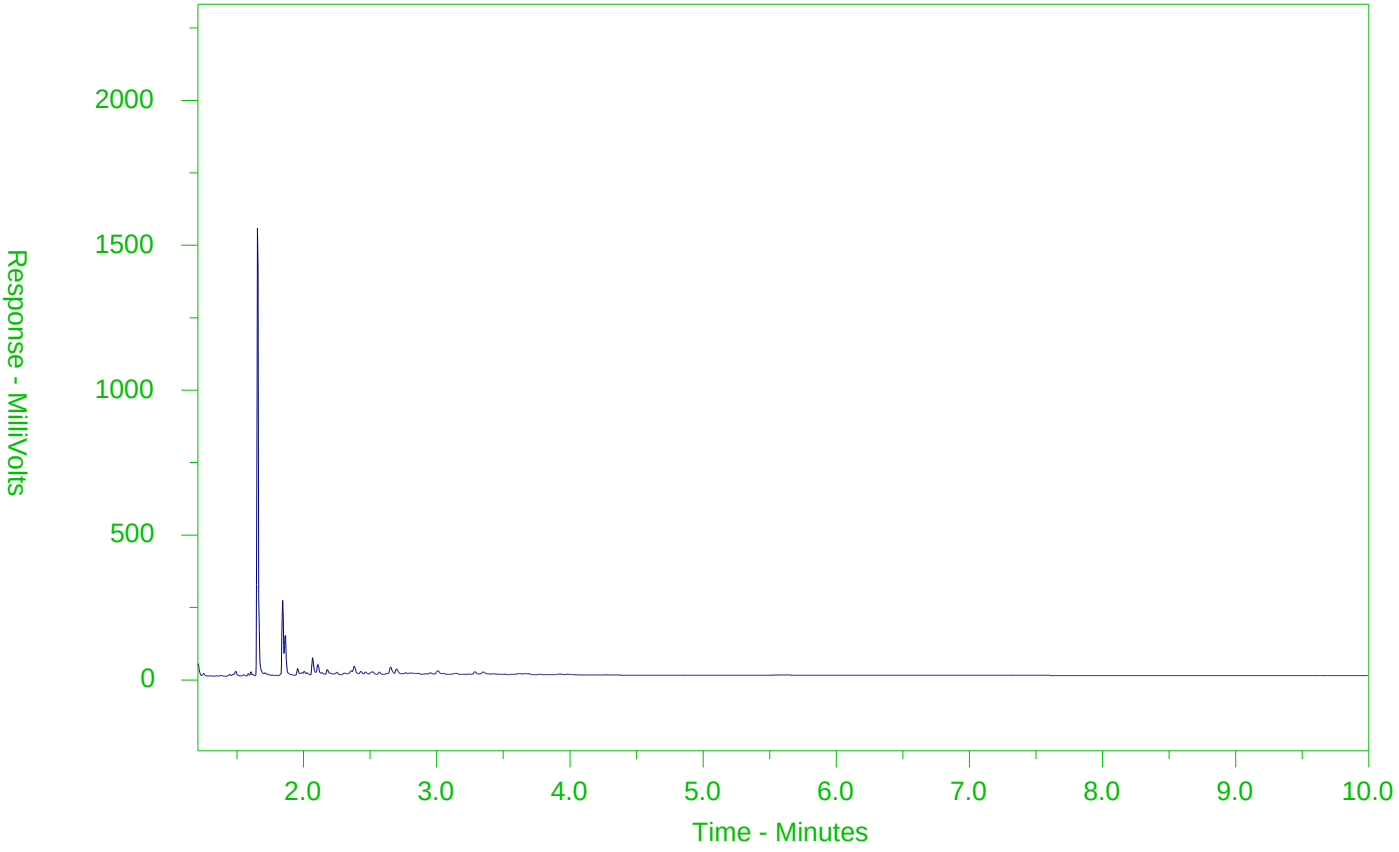
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-8
Client Sample ID: BH18-25-17



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

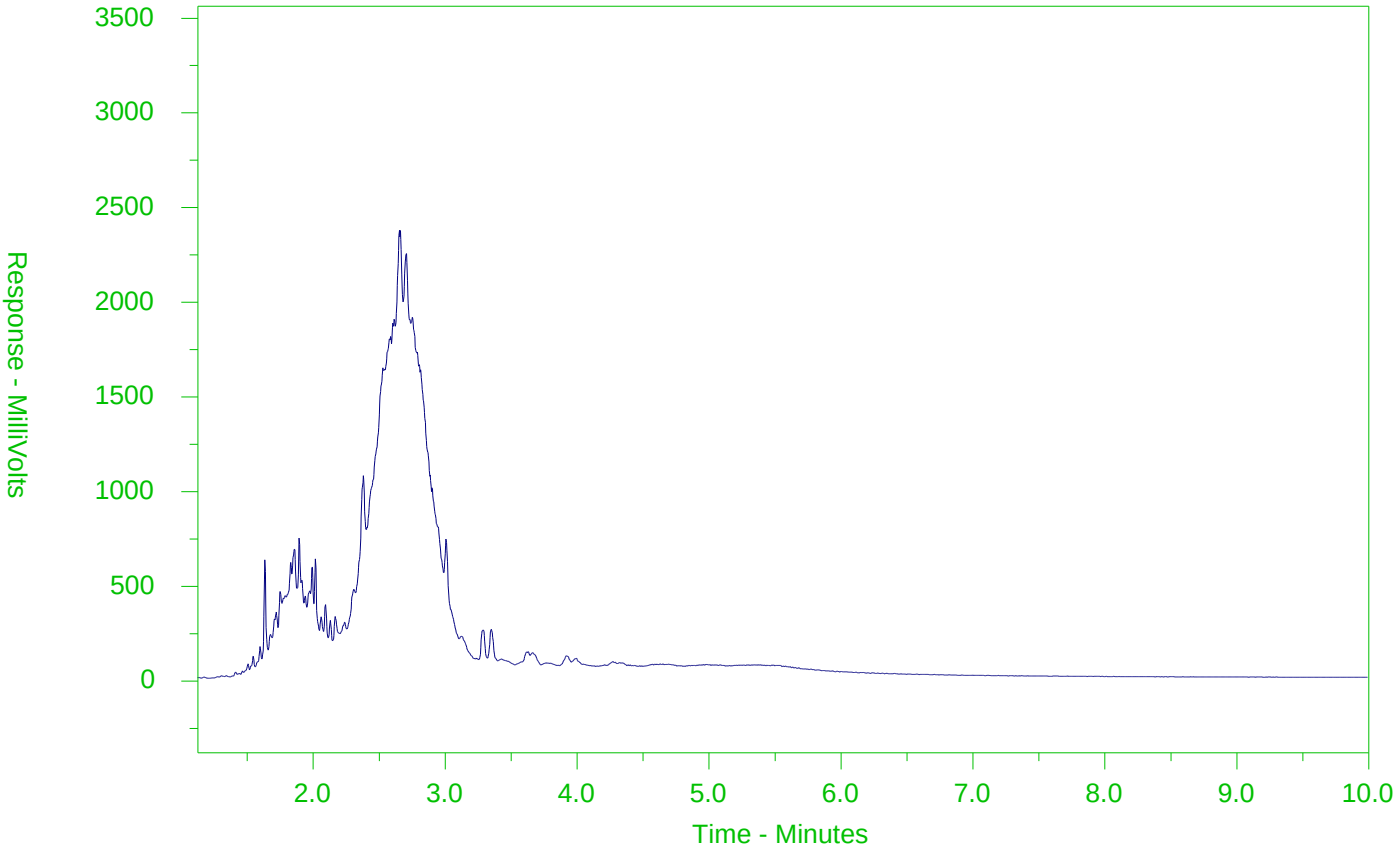
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-10
Client Sample ID: BH18-26-4



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
←Diesel/Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

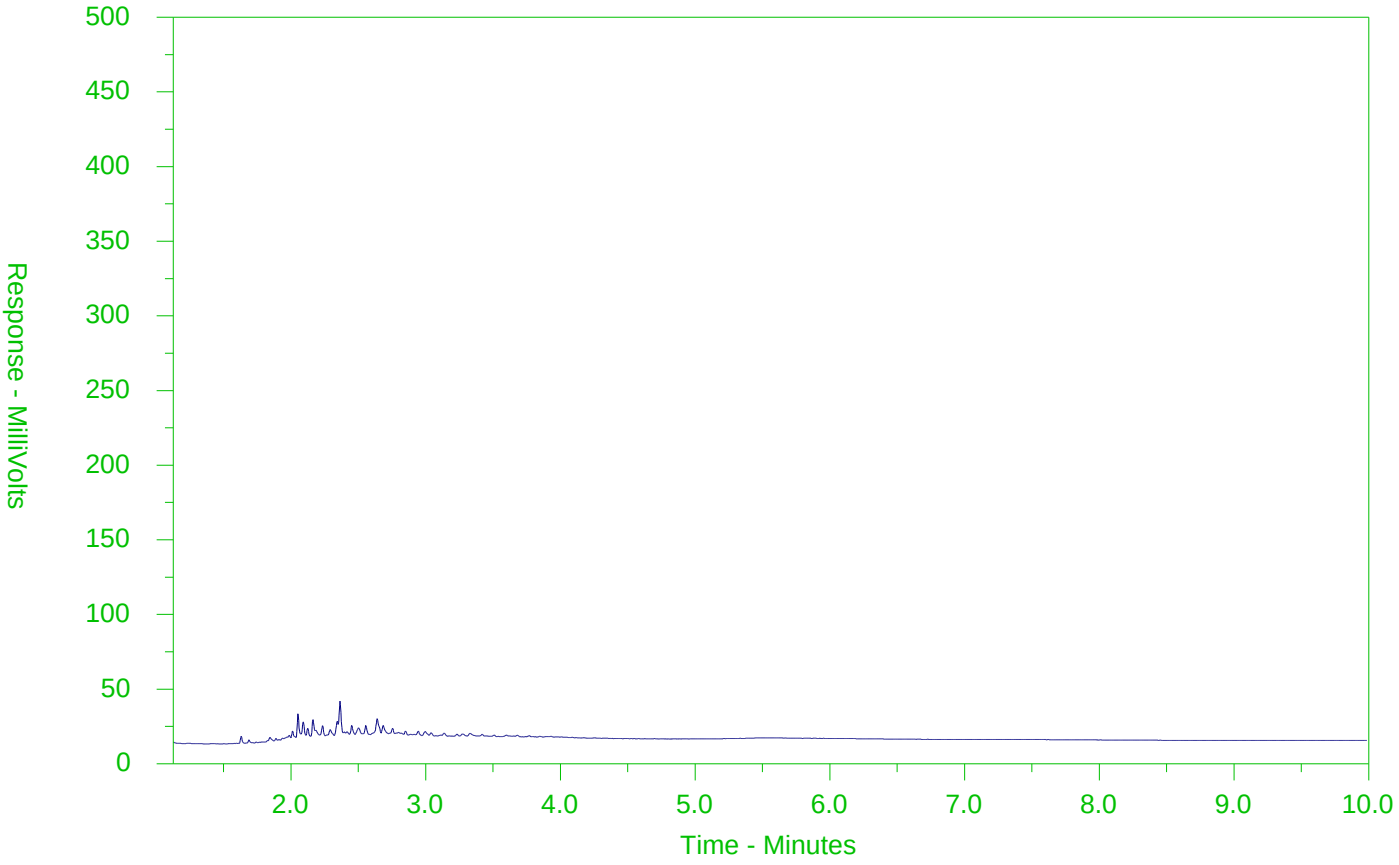
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165098-12
Client Sample ID: BH18-26-18



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2165098-COFC

COC Number: 17 - 616458

Page 1 of 2

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	SNC Lavalin Inc.	Select Report Format: ☑ PDF ☐ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Leon Burger	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:	647-355-2429	☑ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E-100%] ☐ / Same Day, Weekend or Statutory holiday [E2-200%] (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	1005 Skyview Drive	Email 1 or Fax leon.burger@snclavalin.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Burlington/ON	Email 2	
Postal Code:		Email 3	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:		Email 1 or Fax payables@snclavalin.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	655184	Major/Minor Code:	Routing Code:
PO / AFE:	11522	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2165098 ALS Contact: Mathy Sampler: Ariel Barr-Keating

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals+Inorganics	ICP Metals+Hg	VOC	PAH	BTEX/F1+PHC F2-F4	PCB	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	BH18-24-6	12-Sept-18	11:45am	Soil		✓	✓	✓	✓	✓			3
	BH18-24-7	12-Sept-18	11:50am	Soil			✓		✓				2
	BH18-24-12	12-Sept-18	12:50pm	Soil		✓	✓	✓	✓				5
	BH18-25-2		3:50pm			✓							1
	BH18-25-8		4:35pm				✓		✓				3
	BH18-25-12		5:15pm					✓					1
	BH18-25-13		5:20pm		✓								1
	BH18-25-17		6:20pm				✓		✓				3
	BH18-25-18		6:25pm					✓	✓				1
	BH18-26-4	13-Sept-18	9:40am	Soil			✓		✓				3
	BH18-26-14		10:40am			✓		✓	✓				2
	BH18-26-18		11:10am		✓			✓	✓				5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	O.Reg. 153 Tables 3+5
Are samples for human consumption/ use? | | YES | | NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				3.0			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ariel Barr-Keating	Date: 13-Sept-18	Time: 12:00 noon	Received by:	Date:	Time:	Received by: AP	Date: 14-9-18	Time: 15:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2012 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

SNC- Lavalin Inc. (Sudbury/Toronto)
ATTN: LEON BURGER
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Date Received: 17-SEP-18
Report Date: 26-SEP-18 08:29 (MT)
Version: FINAL

Client Phone: 416-635-5882

Certificate of Analysis

Lab Work Order #: L2165631

Project P.O. #: 11522
Job Reference: 655184
C of C Numbers: 17-616459, 17-616460
Legal Site Desc:

Mathy Mahadeva
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-1 BH18-27-2							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	5.90		0.10	%	21-SEP-18		
Metals							
Antimony (Sb)	1.5		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	7.5		1.0	ug/g	21-SEP-18	18	47
Barium (Ba)	82.9		1.0	ug/g	21-SEP-18	670	7700
Beryllium (Be)	<0.50		0.50	ug/g	21-SEP-18	8	60
Boron (B)	11.3		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	0.72		0.10	ug/g	20-SEP-18	2	5000
Cadmium (Cd)	<0.50		0.50	ug/g	21-SEP-18	1.9	7.9
Chromium (Cr)	14.9		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	6.7		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	62.3		1.0	ug/g	21-SEP-18	230	5600
Lead (Pb)	153		1.0	ug/g	21-SEP-18	*120	1000
Mercury (Hg)	0.874		0.0050	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	<1.0		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	14.8		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	<1.0		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	<0.20		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	27.2		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	237		5.0	ug/g	21-SEP-18	340	15000
L2165631-2 BH18-27-4							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Physical Tests							
Conductivity	0.201		0.0040	mS/cm	20-SEP-18	1.4	
% Moisture	21.5		0.10	%	21-SEP-18		
pH	7.40		0.10	pH units	21-SEP-18		
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	21-SEP-18	0.051	0.051
Saturated Paste Extractables							
SAR	<0.10	SAR:DL	0.10	SAR	20-SEP-18	12	
Calcium (Ca)	11.6		1.0	mg/L	20-SEP-18		
Magnesium (Mg)	1.1		1.0	mg/L	20-SEP-18		
Sodium (Na)	<1.0		1.0	mg/L	20-SEP-18		
Metals							
Antimony (Sb)	1.1		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	7.6		1.0	ug/g	21-SEP-18	18	47
Barium (Ba)	48.7		1.0	ug/g	21-SEP-18	670	7700
Beryllium (Be)	<0.50		0.50	ug/g	21-SEP-18	8	60
Boron (B)	8.1		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	0.27		0.10	ug/g	20-SEP-18	2	5000
Cadmium (Cd)	<0.50		0.50	ug/g	21-SEP-18	1.9	7.9

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-2 BH18-27-4							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Metals							
Chromium (Cr)	14.3		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	5.0		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	57.3		1.0	ug/g	21-SEP-18	230	5600
Lead (Pb)	44.8		1.0	ug/g	21-SEP-18	120	1000
Mercury (Hg)	0.0449		0.0050	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	1.0		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	11.3		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	<1.0		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	<0.20		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	28.8		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	93.5		5.0	ug/g	21-SEP-18	340	15000
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	25-SEP-18	8	40
L2165631-3 BH18-27-5							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	22.0		0.10	%	21-SEP-18		
Volatile Organic Compounds							
Benzene	27.5	DLHC	0.054	ug/g	19-SEP-18	*0.32	*6.1
Ethylbenzene	4.91		0.018	ug/g	19-SEP-18	9.5	17
Toluene	13.6	DLHC	0.64	ug/g	19-SEP-18	68	68
o-Xylene	6.24		0.020	ug/g	19-SEP-18		
m+p-Xylenes	14.5	DLHC	0.24	ug/g	19-SEP-18		
Xylenes (Total)	20.7		0.24	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	111.5		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	102.6		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	99	DLHC	40	ug/g	19-SEP-18	*55	*55
F1-BTEX	<40		40	ug/g	24-SEP-18	55	55
F2 (C10-C16)	13200	DLHC	100	ug/g	24-SEP-18	*230	*230
F3 (C16-C34)	8620	DLHC	500	ug/g	24-SEP-18	*1700	*5800
F4 (C34-C50)	1020	DLHC	500	ug/g	24-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	22900		720	ug/g	24-SEP-18		
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	105.9		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	121.0		60-140	%	19-SEP-18		
L2165631-4 BH18-27-6							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Physical Tests							

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L2165631-4	BH18-27-6									
Sampled By:	A. BARR-KEATING on 13-SEP-18									
Matrix:	SOIL						#1	#2		
Physical Tests										
	% Moisture	27.3		0.10	%	21-SEP-18				
Polycyclic Aromatic Hydrocarbons										
	Acenaphthene	464	DLM	5.0	ug/g	24-SEP-18	*96	*330		
	Acenaphthylene	39.6	DLM	5.0	ug/g	24-SEP-18	*0.15	*0.15		
	Anthracene	136	DLM	5.0	ug/g	24-SEP-18	*0.67	*0.67		
	Benzo(a)anthracene	74.7	DLM	5.0	ug/g	24-SEP-18	*0.96	*36		
	Benzo(a)pyrene	47.2	DLM	5.0	ug/g	24-SEP-18	*0.3	*3.6		
	Benzo(b)fluoranthene	62.4	DLM	5.0	ug/g	24-SEP-18	*0.96	*36		
	Benzo(g,h,i)perylene	23.5	DLM	5.0	ug/g	24-SEP-18	*9.6	360		
	Benzo(k)fluoranthene	23.2	DLM	5.0	ug/g	24-SEP-18	*0.96	36		
	Chrysene	60.0	DLM	5.0	ug/g	24-SEP-18	*9.6	360		
	Dibenzo(ah)anthracene	6.2	DLM	5.0	ug/g	24-SEP-18	*0.1	*3.6		
	Fluoranthene	361	DLM	5.0	ug/g	24-SEP-18	*9.6	*360		
	Fluorene	397	DLM	5.0	ug/g	24-SEP-18	*62	*62		
	Indeno(1,2,3-cd)pyrene	24.7	DLM	5.0	ug/g	24-SEP-18	*0.76	36		
	1+2-Methylnaphthalenes	661		4.2	ug/g	24-SEP-18	*76	*76		
	1-Methylnaphthalene	211	DLM	3.0	ug/g	24-SEP-18	*76	*76		
	2-Methylnaphthalene	450	DLM	3.0	ug/g	24-SEP-18	*76	*76		
	Naphthalene	2530	DLM	2.6	ug/g	24-SEP-18	*9.6	*200		
	Phenanthrene	840	DLM	4.6	ug/g	24-SEP-18	*12	*270		
	Pyrene	223	DLM	5.0	ug/g	24-SEP-18	*96	2600		
	Surrogate: 2-Fluorobiphenyl	N/A	SDO:RNA	50-140	%	24-SEP-18				
	Surrogate: p-Terphenyl d14	N/A	SDO:RNA	50-140	%	24-SEP-18				
L2165631-5	BH18-27-66									
Sampled By:	A. BARR-KEATING on 13-SEP-18									
Matrix:	SOIL						#1	#2		
Physical Tests										
	% Moisture	23.4		0.10	%	21-SEP-18				
Polycyclic Aromatic Hydrocarbons										
	Acenaphthene	4.46	DLM	0.13	ug/g	24-SEP-18	96	330		
	Acenaphthylene	0.47	DLM	0.13	ug/g	24-SEP-18	*0.15	*0.15		
	Anthracene	2.00	DLM	0.13	ug/g	24-SEP-18	*0.67	*0.67		
	Benzo(a)anthracene	2.91	DLM	0.13	ug/g	24-SEP-18	*0.96	36		
	Benzo(a)pyrene	2.37	DLM	0.13	ug/g	24-SEP-18	*0.3	3.6		
	Benzo(b)fluoranthene	3.20	DLM	0.13	ug/g	24-SEP-18	*0.96	36		
	Benzo(g,h,i)perylene	1.33	DLM	0.13	ug/g	24-SEP-18	9.6	360		
	Benzo(k)fluoranthene	1.13	DLM	0.13	ug/g	24-SEP-18	*0.96	36		
	Chrysene	2.63	DLM	0.13	ug/g	24-SEP-18	9.6	360		
	Dibenzo(ah)anthracene	0.34	DLM	0.13	ug/g	24-SEP-18	*0.1	3.6		
	Fluoranthene	8.43	DLM	0.13	ug/g	24-SEP-18	9.6	360		
	Fluorene	3.89	DLM	0.13	ug/g	24-SEP-18	62	62		
	Indeno(1,2,3-cd)pyrene	1.37	DLM	0.13	ug/g	24-SEP-18	*0.76	36		
	1+2-Methylnaphthalenes	9.76		0.11	ug/g	24-SEP-18	76	76		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-5 BH18-27-66							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Polycyclic Aromatic Hydrocarbons							
1-Methylnaphthalene	3.86	DLM	0.075	ug/g	24-SEP-18	76	76
2-Methylnaphthalene	5.91	DLM	0.075	ug/g	24-SEP-18	76	76
Naphthalene	84.2	DLM	0.065	ug/g	24-SEP-18	*9.6	200
Phenanthrene	11.0	DLM	0.12	ug/g	24-SEP-18	12	270
Pyrene	6.40	DLM	0.13	ug/g	24-SEP-18	96	2600
Surrogate: 2-Fluorobiphenyl	81.5		50-140	%	24-SEP-18		
Surrogate: p-Terphenyl d14	89.6		50-140	%	24-SEP-18		
L2165631-6 BH18-27-14							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	16.7		0.10	%	21-SEP-18		
Volatile Organic Compounds							
Acetone	<0.50		0.50	ug/g	19-SEP-18	16	16
Benzene	0.0529		0.0068	ug/g	19-SEP-18	0.32	6.1
Bromodichloromethane	<0.050		0.050	ug/g	19-SEP-18	18	50
Bromoform	<0.050		0.050	ug/g	19-SEP-18	0.61	2
Bromomethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
Carbon tetrachloride	<0.050		0.050	ug/g	19-SEP-18	0.21	0.43
Chlorobenzene	<0.050		0.050	ug/g	19-SEP-18	2.4	2.4
Dibromochloromethane	<0.050		0.050	ug/g	19-SEP-18	13	48
Chloroform	<0.050		0.050	ug/g	19-SEP-18	0.47	0.85
1,2-Dibromoethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
1,2-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	6.8	60
1,3-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	9.6	59
1,4-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	0.2	0.39
Dichlorodifluoromethane	<0.050		0.050	ug/g	19-SEP-18	16	16
1,1-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	17	120
1,2-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.055
1,1-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	0.064	0.12
cis-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	55	110
trans-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	1.3	2.9
Methylene Chloride	<0.050		0.050	ug/g	19-SEP-18	1.6	3
1,2-Dichloropropane	<0.050		0.050	ug/g	19-SEP-18	0.16	0.33
cis-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
trans-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
1,3-Dichloropropene (cis & trans)	<0.042		0.042	ug/g	21-SEP-18	0.18	0.4
Ethylbenzene	0.028		0.018	ug/g	19-SEP-18	9.5	17
n-Hexane	<0.050		0.050	ug/g	19-SEP-18	46	54
Methyl Ethyl Ketone	<0.50		0.50	ug/g	19-SEP-18	70	150
Methyl Isobutyl Ketone	<0.50		0.50	ug/g	19-SEP-18	31	64
MTBE	<0.050		0.050	ug/g	19-SEP-18	11	14
Styrene	<0.050		0.050	ug/g	19-SEP-18	34	66
1,1,1,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.087	0.24
1,1,2,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-6 BH18-27-14							
Sampled By: A. BARR-KEATING on 13-SEP-18							
Matrix: SOIL							
Volatile Organic Compounds							
Tetrachloroethylene	<0.050		0.050	ug/g	19-SEP-18	4.5	9.5
Toluene	<0.080		0.080	ug/g	19-SEP-18	68	68
1,1,1-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	6.1	9.8
1,1,2-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.068
Trichloroethylene	<0.010		0.010	ug/g	19-SEP-18	0.91	1.8
Trichlorofluoromethane	<0.050		0.050	ug/g	19-SEP-18	4	4
Vinyl chloride	<0.020		0.020	ug/g	19-SEP-18	0.032	0.057
o-Xylene	0.028		0.020	ug/g	19-SEP-18		
m+p-Xylenes	0.063		0.030	ug/g	19-SEP-18		
Xylenes (Total)	0.092		0.050	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	113.8		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	115.5		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	<5.0		5.0	ug/g	19-SEP-18	55	55
F1-BTEX	<5.0		5.0	ug/g	24-SEP-18	55	55
F2 (C10-C16)	38		10	ug/g	24-SEP-18	230	230
F2-Naphth	26		10	ug/g	24-SEP-18		
F3 (C16-C34)	64		50	ug/g	24-SEP-18	1700	5800
F3-PAH	<50		50	ug/g	24-SEP-18		
F4 (C34-C50)	<50		50	ug/g	24-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	102		72	ug/g	24-SEP-18		
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	91.4		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	85.6		60-140	%	19-SEP-18		
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	4.62	DLM	0.13	ug/g	24-SEP-18	96	330
Acenaphthylene	0.22	DLM	0.13	ug/g	24-SEP-18	*0.15	*0.15
Anthracene	1.35	DLM	0.13	ug/g	24-SEP-18	*0.67	*0.67
Benzo(a)anthracene	0.67	DLM	0.13	ug/g	24-SEP-18	0.96	36
Benzo(a)pyrene	0.42	DLM	0.13	ug/g	24-SEP-18	*0.3	3.6
Benzo(b)fluoranthene	0.55	DLM	0.13	ug/g	24-SEP-18	0.96	36
Benzo(g,h,i)perylene	0.25	DLM	0.13	ug/g	24-SEP-18	9.6	360
Benzo(k)fluoranthene	0.20	DLM	0.13	ug/g	24-SEP-18	0.96	36
Chrysene	0.55	DLM	0.13	ug/g	24-SEP-18	9.6	360
Dibenzo(ah)anthracene	<0.13	DLM	0.13	ug/g	24-SEP-18	**0.1	3.6
Fluoranthene	2.92	DLM	0.13	ug/g	24-SEP-18	9.6	360
Fluorene	4.45	DLM	0.13	ug/g	24-SEP-18	62	62
Indeno(1,2,3-cd)pyrene	0.27	DLM	0.13	ug/g	24-SEP-18	0.76	36
1+2-Methylnaphthalenes	4.75		0.11	ug/g	24-SEP-18	76	76
1-Methylnaphthalene	2.70	DLM	0.075	ug/g	24-SEP-18	76	76
2-Methylnaphthalene	2.05	DLM	0.075	ug/g	24-SEP-18	76	76
Naphthalene	12.5	DLM	0.065	ug/g	24-SEP-18	*9.6	200
Phenanthrene	7.63	DLM	0.12	ug/g	24-SEP-18	12	270
Pyrene	1.85	DLM	0.13	ug/g	24-SEP-18	96	2600
Surrogate: 2-Fluorobiphenyl	85.6		50-140	%	24-SEP-18		
Surrogate: p-Terphenyl d14	79.6		50-140	%	24-SEP-18		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-7 BH18-28-2							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
Conductivity	0.276		0.0040	mS/cm	20-SEP-18	1.4	
% Moisture	10.5		0.10	%	21-SEP-18		
pH	8.07		0.10	pH units	21-SEP-18		
Cyanides							
Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	21-SEP-18	0.051	0.051
Saturated Paste Extractables							
SAR	1.81		0.10	SAR	20-SEP-18	12	
Calcium (Ca)	4.8		1.0	mg/L	20-SEP-18		
Magnesium (Mg)	3.9		1.0	mg/L	20-SEP-18		
Sodium (Na)	22.1		1.0	mg/L	20-SEP-18		
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	5.8		1.0	ug/g	21-SEP-18	18	47
Barium (Ba)	83.8		1.0	ug/g	21-SEP-18	670	7700
Beryllium (Be)	0.70		0.50	ug/g	21-SEP-18	8	60
Boron (B)	9.9		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	1.04		0.10	ug/g	20-SEP-18	2	5000
Cadmium (Cd)	<0.50		0.50	ug/g	21-SEP-18	1.9	7.9
Chromium (Cr)	24.0		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	8.4		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	40.2		1.0	ug/g	21-SEP-18	230	5600
Lead (Pb)	114		1.0	ug/g	21-SEP-18	120	1000
Mercury (Hg)	0.184		0.0050	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	<1.0		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	21.9		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	<1.0		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	<0.20		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	28.9		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	165		5.0	ug/g	21-SEP-18	340	15000
Speciated Metals							
Chromium, Hexavalent	0.56		0.20	ug/g	25-SEP-18	8	40
L2165631-8 BH18-28-5							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	29.4		0.10	%	21-SEP-18		
Volatile Organic Compounds							
Benzene	1.78		0.0068	ug/g	19-SEP-18	*0.32	6.1
Ethylbenzene	14.1		0.018	ug/g	19-SEP-18	*9.5	17
Toluene	0.473		0.080	ug/g	19-SEP-18	68	68
o-Xylene	4.70		0.020	ug/g	19-SEP-18		
m+p-Xylenes	20.2	DLHC	0.12	ug/g	19-SEP-18		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse) **#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)**

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-8 BH18-28-5							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Volatile Organic Compounds							
Xylenes (Total)	24.9		0.12	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	113.6		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	105.2		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	85	DLHC	20	ug/g	19-SEP-18	*55	*55
F1-BTEX	44		20	ug/g	24-SEP-18	55	55
F2 (C10-C16)	1670	DLHC	20	ug/g	24-SEP-18	*230	*230
F2-Naphth	880		250	ug/g	24-SEP-18		
F3 (C16-C34)	1260	DLHC	100	ug/g	24-SEP-18	1700	5800
F3-PAH	930		100	ug/g	24-SEP-18		
F4 (C34-C50)	100	DLHC	100	ug/g	24-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	3110		140	ug/g	24-SEP-18		
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	95.1		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	118.3		60-140	%	19-SEP-18		
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	127	DLM	1.3	ug/g	24-SEP-18	*96	330
Acenaphthylene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.15	**0.15
Anthracene	48.0	DLM	1.3	ug/g	24-SEP-18	*0.67	*0.67
Benzo(a)anthracene	10.2	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Benzo(a)pyrene	4.0	DLM	1.3	ug/g	24-SEP-18	*0.3	*3.6
Benzo(b)fluoranthene	6.1	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Benzo(g,h,i)perylene	1.8	DLM	1.3	ug/g	24-SEP-18	9.6	360
Benzo(k)fluoranthene	2.0	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Chrysene	8.5	DLM	1.3	ug/g	24-SEP-18	9.6	360
Dibenzo(ah)anthracene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.1	3.6
Fluoranthene	67.2	DLM	1.3	ug/g	24-SEP-18	*9.6	360
Fluorene	100	DLM	1.3	ug/g	24-SEP-18	*62	*62
Indeno(1,2,3-cd)pyrene	1.9	DLM	1.3	ug/g	24-SEP-18	*0.76	36
1+2-Methylnaphthalenes	154		1.1	ug/g	24-SEP-18	*76	*76
1-Methylnaphthalene	52.5	DLM	0.75	ug/g	24-SEP-18	76	76
2-Methylnaphthalene	102	DLM	0.75	ug/g	24-SEP-18	*76	*76
Naphthalene	789	DLM	0.65	ug/g	24-SEP-18	*9.6	*200
Phenanthrene	192	DLM	1.2	ug/g	24-SEP-18	*12	270
Pyrene	40.8	DLM	1.3	ug/g	24-SEP-18	96	2600
Surrogate: 2-Fluorobiphenyl	N/A	SDO:RNA	50-140	%	24-SEP-18		
Surrogate: p-Terphenyl d14	N/A	SDO:RNA	50-140	%	24-SEP-18		
L2165631-9 BH18-28-9							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL						#1	#2
Physical Tests							
% Moisture	20.5		0.10	%	21-SEP-18		
Metals							

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-9 BH18-28-9							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Metals							
Antimony (Sb)	<1.0		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	23.8		1.0	ug/g	21-SEP-18	*18	47
Barium (Ba)	111		1.0	ug/g	21-SEP-18	670	7700
Beryllium (Be)	<0.50		0.50	ug/g	21-SEP-18	8	60
Boron (B)	<5.0		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	0.34		0.10	ug/g	21-SEP-18	2	5000
Cadmium (Cd)	<0.50		0.50	ug/g	21-SEP-18	1.9	7.9
Chromium (Cr)	10.7		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	4.8		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	35.7		1.0	ug/g	21-SEP-18	230	5600
Lead (Pb)	490		1.0	ug/g	21-SEP-18	*120	1000
Mercury (Hg)	2.43	DLHC	0.50	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	2.3		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	9.3		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	<1.0		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	0.33		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	21.1		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	194		5.0	ug/g	21-SEP-18	340	15000
Volatile Organic Compounds							
Acetone	<0.50		0.50	ug/g	19-SEP-18	16	16
Benzene	2.50		0.0068	ug/g	19-SEP-18	*0.32	6.1
Bromodichloromethane	<0.050		0.050	ug/g	19-SEP-18	18	50
Bromoform	<0.050		0.050	ug/g	19-SEP-18	0.61	2
Bromomethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
Carbon tetrachloride	<0.050		0.050	ug/g	19-SEP-18	0.21	0.43
Chlorobenzene	<0.050		0.050	ug/g	19-SEP-18	2.4	2.4
Dibromochloromethane	<0.050		0.050	ug/g	19-SEP-18	13	48
Chloroform	<0.050		0.050	ug/g	19-SEP-18	0.47	0.85
1,2-Dibromoethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
1,2-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	6.8	60
1,3-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	9.6	59
1,4-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	0.2	0.39
Dichlorodifluoromethane	<0.050		0.050	ug/g	19-SEP-18	16	16
1,1-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	17	120
1,2-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.055
1,1-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	0.064	0.12
cis-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	55	110
trans-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	1.3	2.9
Methylene Chloride	<0.050		0.050	ug/g	19-SEP-18	1.6	3
1,2-Dichloropropane	<0.050		0.050	ug/g	19-SEP-18	0.16	0.33
cis-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
trans-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
1,3-Dichloropropene (cis & trans)	<0.042		0.042	ug/g	21-SEP-18	0.18	0.4
Ethylbenzene	0.982		0.018	ug/g	19-SEP-18	9.5	17

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-9 BH18-28-9							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Volatile Organic Compounds							
n-Hexane	<0.050		0.050	ug/g	19-SEP-18	46	54
Methyl Ethyl Ketone	<0.50		0.50	ug/g	19-SEP-18	70	150
Methyl Isobutyl Ketone	<0.50		0.50	ug/g	19-SEP-18	31	64
MTBE	<0.050		0.050	ug/g	19-SEP-18	11	14
Styrene	<0.050		0.050	ug/g	19-SEP-18	34	66
1,1,1,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.087	0.24
1,1,2,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
Tetrachloroethylene	<0.050		0.050	ug/g	19-SEP-18	4.5	9.5
Toluene	0.212		0.080	ug/g	19-SEP-18	68	68
1,1,1-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	6.1	9.8
1,1,2-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.068
Trichloroethylene	<0.010		0.010	ug/g	19-SEP-18	0.91	1.8
Trichlorofluoromethane	<0.050		0.050	ug/g	19-SEP-18	4	4
Vinyl chloride	<0.020		0.020	ug/g	19-SEP-18	0.032	0.057
o-Xylene	1.45		0.020	ug/g	19-SEP-18		
m+p-Xylenes	1.52		0.030	ug/g	19-SEP-18		
Xylenes (Total)	2.97		0.050	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	112.5		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	116.9		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	10.3		5.0	ug/g	19-SEP-18	55	55
F1-BTEX	<5.0		5.0	ug/g	24-SEP-18	55	55
F2 (C10-C16)	4330	DLM	50	ug/g	24-SEP-18	*230	*230
F2-Naphth	3160		50	ug/g	24-SEP-18		
F3 (C16-C34)	2500	DLM	250	ug/g	24-SEP-18	*1700	5800
F3-PAH	2170		250	ug/g	24-SEP-18		
F4 (C34-C50)	610	DLM	250	ug/g	24-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	7450		360	ug/g	24-SEP-18		
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	95.3		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	73.8		60-140	%	19-SEP-18		
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	65.8	DLM	1.3	ug/g	24-SEP-18	96	330
Acenaphthylene	5.0	DLM	1.3	ug/g	24-SEP-18	*0.15	*0.15
Anthracene	23.5	DLM	1.3	ug/g	24-SEP-18	*0.67	*0.67
Benzo(a)anthracene	26.7	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Benzo(a)pyrene	21.5	DLM	1.3	ug/g	24-SEP-18	*0.3	*3.6
Benzo(b)fluoranthene	26.4	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Benzo(g,h,i)perylene	10.0	DLM	1.3	ug/g	24-SEP-18	*9.6	360
Benzo(k)fluoranthene	9.8	DLM	1.3	ug/g	24-SEP-18	*0.96	36
Chrysene	21.9	DLM	1.3	ug/g	24-SEP-18	*9.6	360
Dibenzo(ah)anthracene	2.7	DLM	1.3	ug/g	24-SEP-18	*0.1	3.6
Fluoranthene	57.7	DLM	1.3	ug/g	24-SEP-18	*9.6	360
Fluorene	48.7	DLM	1.3	ug/g	24-SEP-18	62	62
Indeno(1,2,3-cd)pyrene	11.1	DLM	1.3	ug/g	24-SEP-18	*0.76	36
1+2-Methylnaphthalenes	375		1.1	ug/g	24-SEP-18	*76	*76

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* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-9 BH18-28-9							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Polycyclic Aromatic Hydrocarbons							
1-Methylnaphthalene	125	DLM	0.75	ug/g	24-SEP-18	*76	*76
2-Methylnaphthalene	251	DLM	0.75	ug/g	24-SEP-18	*76	*76
Naphthalene	1170	DLM	0.65	ug/g	24-SEP-18	*9.6	*200
Phenanthrene	128	DLM	1.2	ug/g	24-SEP-18	*12	270
Pyrene	42.1	DLM	1.3	ug/g	24-SEP-18	96	2600
Surrogate: 2-Fluorobiphenyl	N/A	SDO:RNA	50-140	%	24-SEP-18		
Surrogate: p-Terphenyl d14	N/A	SDO:RNA	50-140	%	24-SEP-18		
L2165631-10 BH18-29-2							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	28.5		0.10	%	21-SEP-18		
Metals							
Antimony (Sb)	1.5		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	22.6		1.0	ug/g	21-SEP-18	*18	47
Barium (Ba)	138		1.0	ug/g	21-SEP-18	670	7700
Beryllium (Be)	0.60		0.50	ug/g	21-SEP-18	8	60
Boron (B)	14.2		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	1.05		0.10	ug/g	21-SEP-18	2	5000
Cadmium (Cd)	0.61		0.50	ug/g	21-SEP-18	1.9	7.9
Chromium (Cr)	20.2		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	8.9		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	133		1.0	ug/g	21-SEP-18	230	5600
Lead (Pb)	166		1.0	ug/g	21-SEP-18	*120	1000
Mercury (Hg)	0.0666		0.0050	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	1.3		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	19.6		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	1.2		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	<0.20		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	37.6		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	337		5.0	ug/g	21-SEP-18	340	15000
L2165631-11 BH18-29-22							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	29.1		0.10	%	21-SEP-18		
Metals							
Antimony (Sb)	14.1		1.0	ug/g	21-SEP-18	40	63
Arsenic (As)	19.3		1.0	ug/g	21-SEP-18	*18	47
Barium (Ba)	247		1.0	ug/g	21-SEP-18	670	7700

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-11 BH18-29-22							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Metals							
Beryllium (Be)	0.66		0.50	ug/g	21-SEP-18	8	60
Boron (B)	14.0		5.0	ug/g	21-SEP-18	120	5000
Boron (B), Hot Water Ext.	1.26		0.10	ug/g	21-SEP-18	2	5000
Cadmium (Cd)	1.62		0.50	ug/g	21-SEP-18	1.9	7.9
Chromium (Cr)	18.4		1.0	ug/g	21-SEP-18	160	11000
Cobalt (Co)	8.8		1.0	ug/g	21-SEP-18	80	2500
Copper (Cu)	4260	DLHC	10	ug/g	21-SEP-18	*230	5600
Lead (Pb)	1510	DLHC	10	ug/g	21-SEP-18	*120	*1000
Mercury (Hg)	1.79	DLHC	0.050	ug/g	20-SEP-18	3.9	13
Molybdenum (Mo)	1.9		1.0	ug/g	21-SEP-18	40	1200
Nickel (Ni)	29.7		1.0	ug/g	21-SEP-18	270	510
Selenium (Se)	1.9		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	2.05		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	33.8		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	1690	DLHC	40	ug/g	21-SEP-18	*340	15000
L2165631-12 BH18-29-3							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	24.3		0.10	%	21-SEP-18		
Volatile Organic Compounds							
Benzene	2.21		0.0068	ug/g	19-SEP-18	*0.32	6.1
Ethylbenzene	4.27		0.018	ug/g	19-SEP-18	9.5	17
Toluene	0.173		0.080	ug/g	19-SEP-18	68	68
o-Xylene	1.01		0.020	ug/g	19-SEP-18		
m+p-Xylenes	5.70		0.030	ug/g	19-SEP-18		
Xylenes (Total)	6.71		0.050	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	110.4		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	100.3		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	31.1		5.0	ug/g	19-SEP-18	55	55
F1-BTEX	17.7		5.0	ug/g	24-SEP-18	55	55
F2 (C10-C16)	437		10	ug/g	24-SEP-18	*230	*230
F3 (C16-C34)	243		50	ug/g	24-SEP-18	1700	5800
F4 (C34-C50)	81		50	ug/g	24-SEP-18	3300	6900
F4G-SG (GHH-Silica)	<250		250	ug/g	20-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	792		72	ug/g	24-SEP-18		
Chrom. to baseline at nC50	NO			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	89.3		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	110.2		60-140	%	19-SEP-18		

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-13 BH18-29-33							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	28.9		0.10	%	21-SEP-18		
Volatile Organic Compounds							
Benzene	2.22		0.0068	ug/g	19-SEP-18	*0.32	6.1
Ethylbenzene	4.59		0.018	ug/g	19-SEP-18	9.5	17
Toluene	0.235		0.080	ug/g	19-SEP-18	68	68
o-Xylene	1.16		0.020	ug/g	19-SEP-18		
m+p-Xylenes	5.80		0.030	ug/g	19-SEP-18		
Xylenes (Total)	6.96		0.050	ug/g	21-SEP-18	26	26
Surrogate: 4-Bromofluorobenzene	106.9		50-140	%	19-SEP-18		
Surrogate: 1,4-Difluorobenzene	97.6		50-140	%	19-SEP-18		
Hydrocarbons							
F1 (C6-C10)	32.6		5.0	ug/g	19-SEP-18	55	55
F1-BTEX	18.6		5.0	ug/g	24-SEP-18	55	55
F2 (C10-C16)	664		10	ug/g	24-SEP-18	*230	*230
F3 (C16-C34)	488		50	ug/g	24-SEP-18	1700	5800
F4 (C34-C50)	158		50	ug/g	24-SEP-18	3300	6900
Total Hydrocarbons (C6-C50)	1340		72	ug/g	24-SEP-18		
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18		
Surrogate: 2-Bromobenzotrifluoride	93.8		60-140	%	24-SEP-18		
Surrogate: 3,4-Dichlorotoluene	95.1		60-140	%	19-SEP-18		
L2165631-14 BH18-29-4							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Physical Tests							
% Moisture	23.7		0.10	%	21-SEP-18		
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	6.75	DLM	0.25	ug/g	24-SEP-18	96	330
Acenaphthylene	0.33	DLM	0.25	ug/g	24-SEP-18	*0.15	*0.15
Anthracene	2.16	DLM	0.25	ug/g	24-SEP-18	*0.67	*0.67
Benzo(a)anthracene	1.92	DLM	0.25	ug/g	24-SEP-18	*0.96	36
Benzo(a)pyrene	1.75	DLM	0.25	ug/g	24-SEP-18	*0.3	3.6
Benzo(b)fluoranthene	2.50	DLM	0.25	ug/g	24-SEP-18	*0.96	36
Benzo(g,h,i)perylene	1.13	DLM	0.25	ug/g	24-SEP-18	9.6	360
Benzo(k)fluoranthene	0.91	DLM	0.25	ug/g	24-SEP-18	0.96	36
Chrysene	1.86	DLM	0.25	ug/g	24-SEP-18	9.6	360
Dibenzo(ah)anthracene	0.28	DLM	0.25	ug/g	24-SEP-18	*0.1	3.6
Fluoranthene	5.70	DLM	0.25	ug/g	24-SEP-18	9.6	360
Fluorene	4.54	DLM	0.25	ug/g	24-SEP-18	62	62
Indeno(1,2,3-cd)pyrene	1.17	DLM	0.25	ug/g	24-SEP-18	*0.76	36
1+2-Methylnaphthalenes	22.3		0.21	ug/g	24-SEP-18	76	76
1-Methylnaphthalene	9.59	DLM	0.15	ug/g	24-SEP-18	76	76
2-Methylnaphthalene	12.8	DLM	0.15	ug/g	24-SEP-18	76	76
Naphthalene	233	DLM	0.13	ug/g	24-SEP-18	*9.6	*200
Phenanthrene	11.9	DLM	0.23	ug/g	24-SEP-18	12	270
Pyrene	4.08	DLM	0.25	ug/g	24-SEP-18	96	2600

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L2165631-14 BH18-29-4									
Sampled By: A. BARR-KEATING on 14-SEP-18									
Matrix: SOIL						#1	#2		
Polycyclic Aromatic Hydrocarbons									
Surrogate: 2-Fluorobiphenyl	84.2		50-140	%	24-SEP-18				
Surrogate: p-Terphenyl d14	82.4		50-140	%	24-SEP-18				
L2165631-15 BH18-29-44									
Sampled By: A. BARR-KEATING on 14-SEP-18									
Matrix: SOIL						#1	#2		
Physical Tests									
% Moisture	27.8		0.10	%	21-SEP-18				
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	8.5	DLM	1.3	ug/g	24-SEP-18	96	330		
Acenaphthylene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.15	**0.15		
Anthracene	2.2	DLM	1.3	ug/g	24-SEP-18	*0.67	*0.67		
Benzo(a)anthracene	3.4	DLM	1.3	ug/g	24-SEP-18	*0.96	36		
Benzo(a)pyrene	2.9	DLM	1.3	ug/g	24-SEP-18	*0.3	3.6		
Benzo(b)fluoranthene	3.9	DLM	1.3	ug/g	24-SEP-18	*0.96	36		
Benzo(g,h,i)perylene	1.8	DLM	1.3	ug/g	24-SEP-18	9.6	360		
Benzo(k)fluoranthene	1.5	DLM	1.3	ug/g	24-SEP-18	*0.96	36		
Chrysene	3.2	DLM	1.3	ug/g	24-SEP-18	9.6	360		
Dibenzo(ah)anthracene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.1	3.6		
Fluoranthene	9.3	DLM	1.3	ug/g	24-SEP-18	9.6	360		
Fluorene	4.2	DLM	1.3	ug/g	24-SEP-18	62	62		
Indeno(1,2,3-cd)pyrene	1.8	DLM	1.3	ug/g	24-SEP-18	*0.76	36		
1+2-Methylnaphthalenes	23.0		1.1	ug/g	24-SEP-18	76	76		
1-Methylnaphthalene	9.97	DLM	0.75	ug/g	24-SEP-18	76	76		
2-Methylnaphthalene	13.0	DLM	0.75	ug/g	24-SEP-18	76	76		
Naphthalene	209	DLM	0.65	ug/g	24-SEP-18	*9.6	*200		
Phenanthrene	12.9	DLM	1.2	ug/g	24-SEP-18	*12	270		
Pyrene	6.7	DLM	1.3	ug/g	24-SEP-18	96	2600		
Surrogate: 2-Fluorobiphenyl	N/A	SDO:RNA	50-140	%	24-SEP-18				
Surrogate: p-Terphenyl d14	N/A	SDO:RNA	50-140	%	24-SEP-18				
L2165631-16 BH18-29-7									
Sampled By: A. BARR-KEATING on 14-SEP-18									
Matrix: SOIL						#1	#2		
Physical Tests									
% Moisture	28.7		0.10	%	21-SEP-18				
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	31.2	DLM	1.3	ug/g	24-SEP-18	96	330		
Acenaphthylene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.15	**0.15		
Anthracene	7.6	DLM	1.3	ug/g	24-SEP-18	*0.67	*0.67		
Benzo(a)anthracene	4.9	DLM	1.3	ug/g	24-SEP-18	*0.96	36		
Benzo(a)pyrene	3.5	DLM	1.3	ug/g	24-SEP-18	*0.3	3.6		
Benzo(b)fluoranthene	4.9	DLM	1.3	ug/g	24-SEP-18	*0.96	36		
Benzo(g,h,i)perylene	2.1	DLM	1.3	ug/g	24-SEP-18	9.6	360		

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2
L2165631-16	BH18-29-7							
Sampled By:	A. BARR-KEATING on 14-SEP-18							
Matrix:	SOIL							
Polycyclic Aromatic Hydrocarbons								
	Benzo(k)fluoranthene	1.7	DLM	1.3	ug/g	24-SEP-18	*0.96	36
	Chrysene	4.6	DLM	1.3	ug/g	24-SEP-18	9.6	360
	Dibenzo(ah)anthracene	<1.3	DLM	1.3	ug/g	24-SEP-18	**0.1	3.6
	Fluoranthene	22.9	DLM	1.3	ug/g	24-SEP-18	*9.6	360
	Fluorene	23.3	DLM	1.3	ug/g	24-SEP-18	62	62
	Indeno(1,2,3-cd)pyrene	2.1	DLM	1.3	ug/g	24-SEP-18	*0.76	36
	1+2-Methylnaphthalenes	54.0		1.1	ug/g	24-SEP-18	76	76
	1-Methylnaphthalene	20.4	DLM	0.75	ug/g	24-SEP-18	76	76
	2-Methylnaphthalene	33.6	DLM	0.75	ug/g	24-SEP-18	76	76
	Naphthalene	286	DLM	0.65	ug/g	24-SEP-18	*9.6	*200
	Phenanthrene	56.7	DLM	1.2	ug/g	24-SEP-18	*12	270
	Pyrene	14.5	DLM	1.3	ug/g	24-SEP-18	96	2600
	Surrogate: 2-Fluorobiphenyl	N/A	SDO:RNA	50-140	%	24-SEP-18		
	Surrogate: p-Terphenyl d14	N/A	SDO:RNA	50-140	%	24-SEP-18		
L2165631-17	BH18-29-12							
Sampled By:	A. BARR-KEATING on 14-SEP-18							
Matrix:	SOIL							
Physical Tests								
	Conductivity	0.388		0.0040	mS/cm	20-SEP-18	1.4	
	% Moisture	24.9		0.10	%	21-SEP-18		
	pH	7.63		0.10	pH units	21-SEP-18		
Cyanides								
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	24-SEP-18	0.051	0.051
Saturated Paste Extractables								
	SAR	2.49		0.10	SAR	20-SEP-18	12	
	Calcium (Ca)	8.6		1.0	mg/L	20-SEP-18		
	Magnesium (Mg)	1.6		1.0	mg/L	20-SEP-18		
	Sodium (Na)	30.5		1.0	mg/L	20-SEP-18		
Metals								
	Antimony (Sb)	<1.0		1.0	ug/g	21-SEP-18	40	63
	Arsenic (As)	6.9		1.0	ug/g	21-SEP-18	18	47
	Barium (Ba)	101		1.0	ug/g	21-SEP-18	670	7700
	Beryllium (Be)	0.56		0.50	ug/g	21-SEP-18	8	60
	Boron (B)	9.2		5.0	ug/g	21-SEP-18	120	5000
	Boron (B), Hot Water Ext.	0.47		0.10	ug/g	21-SEP-18	2	5000
	Cadmium (Cd)	<0.50		0.50	ug/g	21-SEP-18	1.9	7.9
	Chromium (Cr)	18.3		1.0	ug/g	21-SEP-18	160	11000
	Cobalt (Co)	9.0		1.0	ug/g	21-SEP-18	80	2500
	Copper (Cu)	41.5		1.0	ug/g	21-SEP-18	230	5600
	Lead (Pb)	79.3		1.0	ug/g	21-SEP-18	120	1000
	Mercury (Hg)	0.380		0.0050	ug/g	20-SEP-18	3.9	13
	Molybdenum (Mo)	<1.0		1.0	ug/g	21-SEP-18	40	1200
	Nickel (Ni)	18.9		1.0	ug/g	21-SEP-18	270	510

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Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2165631-17 BH18-29-12							
Sampled By: A. BARR-KEATING on 14-SEP-18							
Matrix: SOIL							
Metals							
Selenium (Se)	<1.0		1.0	ug/g	21-SEP-18	5.5	1200
Silver (Ag)	0.23		0.20	ug/g	21-SEP-18	40	490
Thallium (Tl)	<0.50		0.50	ug/g	21-SEP-18	3.3	33
Uranium (U)	<1.0		1.0	ug/g	21-SEP-18	33	300
Vanadium (V)	28.5		1.0	ug/g	21-SEP-18	86	160
Zinc (Zn)	103		5.0	ug/g	21-SEP-18	340	15000
Speciated Metals							
Chromium, Hexavalent	<0.20		0.20	ug/g	25-SEP-18	8	40
Volatile Organic Compounds							
Acetone	<0.50		0.50	ug/g	19-SEP-18	16	16
Benzene	0.0153		0.0068	ug/g	19-SEP-18	0.32	6.1
Bromodichloromethane	<0.050		0.050	ug/g	19-SEP-18	18	50
Bromoform	<0.050		0.050	ug/g	19-SEP-18	0.61	2
Bromomethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
Carbon tetrachloride	<0.050		0.050	ug/g	19-SEP-18	0.21	0.43
Chlorobenzene	<0.050		0.050	ug/g	19-SEP-18	2.4	2.4
Dibromochloromethane	<0.050		0.050	ug/g	19-SEP-18	13	48
Chloroform	<0.050		0.050	ug/g	19-SEP-18	0.47	0.85
1,2-Dibromoethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
1,2-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	6.8	60
1,3-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	9.6	59
1,4-Dichlorobenzene	<0.050		0.050	ug/g	19-SEP-18	0.2	0.39
Dichlorodifluoromethane	<0.050		0.050	ug/g	19-SEP-18	16	16
1,1-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	17	120
1,2-Dichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.055
1,1-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	0.064	0.12
cis-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	55	110
trans-1,2-Dichloroethylene	<0.050		0.050	ug/g	19-SEP-18	1.3	2.9
Methylene Chloride	<0.050		0.050	ug/g	19-SEP-18	1.6	3
1,2-Dichloropropane	<0.050		0.050	ug/g	19-SEP-18	0.16	0.33
cis-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
trans-1,3-Dichloropropene	<0.030		0.030	ug/g	19-SEP-18		
1,3-Dichloropropene (cis & trans)	<0.042		0.042	ug/g	21-SEP-18	0.18	0.4
Ethylbenzene	0.029		0.018	ug/g	19-SEP-18	9.5	17
n-Hexane	<0.050		0.050	ug/g	19-SEP-18	46	54
Methyl Ethyl Ketone	<0.50		0.50	ug/g	19-SEP-18	70	150
Methyl Isobutyl Ketone	<0.50		0.50	ug/g	19-SEP-18	31	64
MTBE	<0.050		0.050	ug/g	19-SEP-18	11	14
Styrene	<0.050		0.050	ug/g	19-SEP-18	34	66
1,1,1,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.087	0.24
1,1,2,2-Tetrachloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.05
Tetrachloroethylene	<0.050		0.050	ug/g	19-SEP-18	4.5	9.5
Toluene	<0.080		0.080	ug/g	19-SEP-18	68	68
1,1,1-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	6.1	9.8
1,1,2-Trichloroethane	<0.050		0.050	ug/g	19-SEP-18	0.05	0.068

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2		
L2165631-17 BH18-29-12 Sampled By: A. BARR-KEATING on 14-SEP-18 Matrix: SOIL									
Volatile Organic Compounds									
Trichloroethylene	<0.010		0.010	ug/g	19-SEP-18	0.91	1.8		
Trichlorofluoromethane	<0.050		0.050	ug/g	19-SEP-18	4	4		
Vinyl chloride	<0.020		0.020	ug/g	19-SEP-18	0.032	0.057		
o-Xylene	0.021		0.020	ug/g	19-SEP-18				
m+p-Xylenes	0.055		0.030	ug/g	19-SEP-18				
Xylenes (Total)	0.076		0.050	ug/g	21-SEP-18	26	26		
Surrogate: 4-Bromofluorobenzene	113.4		50-140	%	19-SEP-18				
Surrogate: 1,4-Difluorobenzene	115.4		50-140	%	19-SEP-18				
Hydrocarbons									
F1 (C6-C10)	<5.0		5.0	ug/g	19-SEP-18	55	55		
F1-BTEX	<5.0		5.0	ug/g	24-SEP-18	55	55		
F2 (C10-C16)	53		10	ug/g	24-SEP-18	230	230		
F3 (C16-C34)	66		50	ug/g	24-SEP-18	1700	5800		
F4 (C34-C50)	<50		50	ug/g	24-SEP-18	3300	6900		
Total Hydrocarbons (C6-C50)	120		72	ug/g	24-SEP-18				
Chrom. to baseline at nC50	YES			No Unit	24-SEP-18				
Surrogate: 2-Bromobenzotrifluoride	89.0		60-140	%	24-SEP-18				
Surrogate: 3,4-Dichlorotoluene	87.7		60-140	%	19-SEP-18				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T3/T5-SOIL-ICC/SS-COARSE

#1: T3-Soil-Ind/Com/Commu. Property Use (Coarse)

#2: T5-Subsurface Soil-Ind/Com/Commu. Property Use (Coarse)

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
SAR:DL	SAR is incalculable due to undetectable Na. Detection Limit represents maximum possible SAR value.
SDO:RNA	Surrogate diluted out:% recovery not available
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F4G-ADD-511-WT	Soil	F4G SG-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

F4G, gravimetric analysis, is determined if the chromatogram does not return to baseline at or before C50. A soil sample is extracted with a solvent mix, the solvent is evaporated and the weight of the residue is determined.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking techniqueis used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

VOC-1,3-DCP-CALC-WT	Soil	Regulation 153 VOCs	SW8260B/SW8270C
VOC-511-HS-WT	Soil	VOC-O.Reg 153/04 (July 2011)	SW846 8260 (511)

Soil and sediment samples are extracted in methanol and analyzed by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

17-616459 17-616460

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2165631 Report Date: 26-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT	**Soil**							
Batch R4226989								
WG2881365-4 DUP		**L2167165-7**						
Boron (B), Hot Water Ext.		0.24	0.22		ug/g	7.2	30	20-SEP-18
WG2881365-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			92.8		%		70-130	20-SEP-18
WG2881365-3 LCS								
Boron (B), Hot Water Ext.			118.1		%		70-130	20-SEP-18
WG2881365-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	20-SEP-18
Batch R4231731								
WG2881881-4 DUP		**L2165647-2**						
Boron (B), Hot Water Ext.		0.10	0.10		ug/g	4.3	30	21-SEP-18
WG2881881-2 IRM		**HOTB-SAL_SOIL5**						
Boron (B), Hot Water Ext.			83.6		%		70-130	21-SEP-18
WG2881881-3 LCS								
Boron (B), Hot Water Ext.			110.1		%		70-130	21-SEP-18
WG2881881-1 MB								
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	21-SEP-18
BTX-511-HS-WT	**Soil**							
Batch R4221730								
WG2879270-4 DUP		**WG2879270-3**						
Benzene		27.5	25.8		ug/g	6.3	40	20-SEP-18
Ethylbenzene		4.91	5.20		ug/g	5.8	40	19-SEP-18
m+p-Xylenes		14.5	14.1		ug/g	3.0	40	20-SEP-18
o-Xylene		6.24	6.34		ug/g	1.6	40	19-SEP-18
Toluene		13.6	12.9		ug/g	5.4	40	20-SEP-18
WG2879270-2 LCS								
Benzene			96.8		%		70-130	19-SEP-18
Ethylbenzene			95.6		%		70-130	19-SEP-18
m+p-Xylenes			98.1		%		70-130	19-SEP-18
o-Xylene			96.9		%		70-130	19-SEP-18
Toluene			99.2		%		70-130	19-SEP-18
WG2879270-1 MB								
Benzene			<0.0068		ug/g		0.0068	19-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	19-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	19-SEP-18
o-Xylene			<0.020		ug/g		0.02	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT	**Soil**							
Batch R4221730								
WG2879270-1 MB								
Toluene			<0.080		ug/g		0.08	19-SEP-18
Surrogate: 1,4-Difluorobenzene			99.1		%		50-140	19-SEP-18
Surrogate: 4-Bromofluorobenzene			101.4		%		50-140	19-SEP-18
WG2879270-5 MS		**L2165631-3**						
Benzene			N/A	MS-B	%		-	19-SEP-18
Ethylbenzene			N/A	MS-B	%		-	19-SEP-18
m+p-Xylenes			N/A	MS-B	%		-	19-SEP-18
o-Xylene			N/A	MS-B	%		-	19-SEP-18
Toluene			N/A	MS-B	%		-	19-SEP-18
CN-WAD-R511-WT	**Soil**							
Batch R4230128								
WG2882413-3 DUP		**L2165519-1**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	21-SEP-18
WG2882413-2 LCS								
Cyanide, Weak Acid Diss			105.6		%		80-120	21-SEP-18
WG2882413-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	21-SEP-18
WG2882413-4 MS		**L2165519-1**						
Cyanide, Weak Acid Diss			93.9		%		70-130	21-SEP-18
Batch R4236687								
WG2883176-3 DUP		**L2165631-17**						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	24-SEP-18
WG2883176-2 LCS								
Cyanide, Weak Acid Diss			96.2		%		80-120	24-SEP-18
WG2883176-1 MB								
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	24-SEP-18
WG2883176-4 MS		**L2165631-17**						
Cyanide, Weak Acid Diss			106.6		%		70-130	24-SEP-18
CR-CR6-IC-WT	**Soil**							
Batch R4239114								
WG2884850-4 CRM		**WT-SQC012**						
Chromium, Hexavalent			92.4		%		70-130	25-SEP-18
WG2884850-3 DUP		**L2167324-4**						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	25-SEP-18
WG2884850-2 LCS								
Chromium, Hexavalent			98.3		%		80-120	25-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	**Soil**							
Batch R4239114								
WG2884850-1 MB								
Chromium, Hexavalent			<0.20		ug/g		0.2	25-SEP-18
EC-WT	**Soil**							
Batch R4227274								
WG2881373-4 DUP		**WG2881373-3**						
Conductivity		0.171	0.172		mS/cm	1.0	20	20-SEP-18
WG2881373-2 IRM		**WT SAR2**						
Conductivity			93.0		%		70-130	20-SEP-18
WG2881497-1 LCS								
Conductivity			100.1		%		90-110	20-SEP-18
WG2881373-1 MB								
Conductivity			<0.0040		mS/cm		0.004	20-SEP-18
F1-HS-511-WT	**Soil**							
Batch R4221652								
WG2879176-4 DUP		**WG2879176-3**						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	19-SEP-18
WG2879176-2 LCS								
F1 (C6-C10)			95.9		%		80-120	18-SEP-18
WG2879176-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	18-SEP-18
Surrogate: 3,4-Dichlorotoluene			91.6		%		60-140	18-SEP-18
WG2879176-6 MS		**L2165622-3**						
F1 (C6-C10)			95.3		%		60-140	19-SEP-18
Batch R4221730								
WG2879270-4 DUP		**WG2879270-3**						
F1 (C6-C10)		99	97		ug/g	2.2	30	20-SEP-18
WG2879270-2 LCS								
F1 (C6-C10)			100.5		%		80-120	19-SEP-18
WG2879270-1 MB								
F1 (C6-C10)			<5.0		ug/g		5	19-SEP-18
Surrogate: 3,4-Dichlorotoluene			123.3		%		60-140	19-SEP-18
WG2879270-6 MS		**L2165622-1**						
F1 (C6-C10)			107.0		%		60-140	19-SEP-18
F2-F4-511-WT	**Soil**							

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	**Soil**							
Batch R4235289								
WG2881671-3 DUP		**WG2881671-5**						
F2 (C10-C16)		<10	<10	RPD-NA	ug/g	N/A	30	24-SEP-18
F3 (C16-C34)		<50	<50	RPD-NA	ug/g	N/A	30	24-SEP-18
F4 (C34-C50)		<50	<50	RPD-NA	ug/g	N/A	30	24-SEP-18
WG2881671-2 LCS								
F2 (C10-C16)			98.7		%		80-120	24-SEP-18
F3 (C16-C34)			99.4		%		80-120	24-SEP-18
F4 (C34-C50)			97.9		%		80-120	24-SEP-18
WG2881671-1 MB								
F2 (C10-C16)			<10		ug/g		10	24-SEP-18
F3 (C16-C34)			<50		ug/g		50	24-SEP-18
F4 (C34-C50)			<50		ug/g		50	24-SEP-18
Surrogate: 2-Bromobenzotrifluoride			87.6		%		60-140	24-SEP-18
WG2881671-4 MS		**WG2881671-5**						
F2 (C10-C16)			90.6		%		60-140	24-SEP-18
F3 (C16-C34)			90.8		%		60-140	24-SEP-18
F4 (C34-C50)			89.2		%		60-140	24-SEP-18
F4G-ADD-511-WT	**Soil**							
Batch R4240454								
WG2886504-2 LCS								
F4G-SG (GHH-Silica)			110.3		%		60-140	20-SEP-18
WG2886504-1 MB								
F4G-SG (GHH-Silica)			<250		ug/g		250	20-SEP-18
HG-200.2-CVAA-WT	**Soil**							
Batch R4227190								
WG2881349-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			107.7		%		70-130	20-SEP-18
WG2881349-6 DUP		**WG2881349-5**						
Mercury (Hg)		<0.0050	<0.0050	RPD-NA	ug/g	N/A	40	20-SEP-18
WG2881349-3 LCS								
Mercury (Hg)			108.0		%		80-120	20-SEP-18
WG2881349-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	20-SEP-18
Batch R4227210								
WG2881355-2 CRM		**WT-CANMET-TILL1**						
Mercury (Hg)			109.1		%		70-130	20-SEP-18
WG2881355-6 DUP		**WG2881355-5**						

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-WT	**Soil**							
Batch R4227210								
WG2881355-6 DUP		**WG2881355-5**						
Mercury (Hg)		0.0166	0.0166		ug/g	0.0	40	20-SEP-18
WG2881355-3 LCS								
Mercury (Hg)			112.5		%		80-120	20-SEP-18
WG2881355-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	20-SEP-18
MET-200.2-CCMS-WT	**Soil**							
Batch R4230290								
WG2881355-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			95.5		%		70-130	21-SEP-18
Arsenic (As)			99.6		%		70-130	21-SEP-18
Barium (Ba)			102.5		%		70-130	21-SEP-18
Beryllium (Be)			106.0		%		70-130	21-SEP-18
Boron (B)			3.3		mg/kg		0-8.2	21-SEP-18
Cadmium (Cd)			105.5		%		70-130	21-SEP-18
Chromium (Cr)			102.9		%		70-130	21-SEP-18
Cobalt (Co)			98.0		%		70-130	21-SEP-18
Copper (Cu)			100.3		%		70-130	21-SEP-18
Lead (Pb)			95.2		%		70-130	21-SEP-18
Molybdenum (Mo)			92.7		%		70-130	21-SEP-18
Nickel (Ni)			98.8		%		70-130	21-SEP-18
Selenium (Se)			0.30		mg/kg		0.11-0.51	21-SEP-18
Silver (Ag)			0.22		mg/kg		0.13-0.33	21-SEP-18
Thallium (Tl)			0.123		mg/kg		0.077-0.18	21-SEP-18
Uranium (U)			96.5		%		70-130	21-SEP-18
Vanadium (V)			102.6		%		70-130	21-SEP-18
Zinc (Zn)			100.6		%		70-130	21-SEP-18
WG2881355-6 DUP		**WG2881355-5**						
Antimony (Sb)		<0.10	<0.10	RPD-NA	ug/g	N/A	30	21-SEP-18
Arsenic (As)		3.52	3.50		ug/g	0.8	30	21-SEP-18
Barium (Ba)		92.7	87.5		ug/g	5.8	40	21-SEP-18
Beryllium (Be)		0.57	0.54		ug/g	4.3	30	21-SEP-18
Boron (B)		8.5	8.4		ug/g	0.6	30	21-SEP-18
Cadmium (Cd)		0.113	0.100		ug/g	12	30	21-SEP-18
Chromium (Cr)		20.4	20.0		ug/g	1.8	30	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4230290								
WG2881355-6 DUP		**WG2881355-5**						
Cobalt (Co)		8.51	8.21		ug/g	3.6	30	21-SEP-18
Copper (Cu)		18.1	17.6		ug/g	3.2	30	21-SEP-18
Lead (Pb)		8.13	8.36		ug/g	2.8	40	21-SEP-18
Molybdenum (Mo)		0.39	0.38		ug/g	1.2	40	21-SEP-18
Nickel (Ni)		18.3	17.3		ug/g	5.7	30	21-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	21-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	21-SEP-18
Thallium (Tl)		0.162	0.165		ug/g	1.8	30	21-SEP-18
Uranium (U)		0.629	0.608		ug/g	3.4	30	21-SEP-18
Vanadium (V)		32.8	32.3		ug/g	1.7	30	21-SEP-18
Zinc (Zn)		42.2	41.0		ug/g	3.0	30	21-SEP-18
WG2881355-4 LCS								
Antimony (Sb)			117.3		%		80-120	21-SEP-18
Arsenic (As)			119.2		%		80-120	21-SEP-18
Barium (Ba)			116.3		%		80-120	21-SEP-18
Beryllium (Be)			113.5		%		80-120	21-SEP-18
Boron (B)			95.2		%		80-120	21-SEP-18
Cadmium (Cd)			113.3		%		80-120	21-SEP-18
Chromium (Cr)			116.0		%		80-120	21-SEP-18
Cobalt (Co)			113.3		%		80-120	21-SEP-18
Copper (Cu)			113.5		%		80-120	21-SEP-18
Lead (Pb)			116.0		%		80-120	21-SEP-18
Molybdenum (Mo)			109.6		%		80-120	21-SEP-18
Nickel (Ni)			112.2		%		80-120	21-SEP-18
Selenium (Se)			111.2		%		80-120	21-SEP-18
Silver (Ag)			109.0		%		80-120	21-SEP-18
Thallium (Tl)			114.4		%		80-120	21-SEP-18
Uranium (U)			112.4		%		80-120	21-SEP-18
Vanadium (V)			119.9		%		80-120	21-SEP-18
Zinc (Zn)			110.2		%		80-120	21-SEP-18
WG2881355-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	21-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	21-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4230290								
WG2881355-1 MB								
Barium (Ba)			<0.50		mg/kg		0.5	21-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	21-SEP-18
Boron (B)			<5.0		mg/kg		5	21-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	21-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	21-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	21-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	21-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	21-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	21-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	21-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	21-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	21-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	21-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	21-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	21-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	21-SEP-18
Batch R4230295								
WG2881349-2 CRM		**WT-CANMET-TILL1**						
Antimony (Sb)			106.0		%		70-130	21-SEP-18
Arsenic (As)			104.1		%		70-130	21-SEP-18
Barium (Ba)			103.8		%		70-130	21-SEP-18
Beryllium (Be)			112.2		%		70-130	21-SEP-18
Boron (B)			3.1		mg/kg		0-8.2	21-SEP-18
Cadmium (Cd)			114.6		%		70-130	21-SEP-18
Chromium (Cr)			105.1		%		70-130	21-SEP-18
Cobalt (Co)			105.4		%		70-130	21-SEP-18
Copper (Cu)			107.6		%		70-130	21-SEP-18
Lead (Pb)			102.3		%		70-130	21-SEP-18
Molybdenum (Mo)			101.1		%		70-130	21-SEP-18
Nickel (Ni)			105.3		%		70-130	21-SEP-18
Selenium (Se)			0.34		mg/kg		0.11-0.51	21-SEP-18
Silver (Ag)			0.23		mg/kg		0.13-0.33	21-SEP-18
Thallium (Tl)			0.128		mg/kg		0.077-0.18	21-SEP-18
Uranium (U)			105.9		%		70-130	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1

Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4230295								
WG2881349-2 CRM		**WT-CANMET-TILL1**						
Vanadium (V)			108.0		%		70-130	21-SEP-18
Zinc (Zn)			104.5		%		70-130	21-SEP-18
WG2881349-6 DUP		**WG2881349-5**						
Antimony (Sb)		0.46	0.49		ug/g	4.9	30	21-SEP-18
Arsenic (As)		4.70	4.64		ug/g	1.3	30	21-SEP-18
Barium (Ba)		254	250		ug/g	1.8	40	21-SEP-18
Beryllium (Be)		0.90	0.89		ug/g	0.9	30	21-SEP-18
Boron (B)		25.0	25.8		ug/g	3.0	30	21-SEP-18
Cadmium (Cd)		0.113	0.124		ug/g	8.9	30	21-SEP-18
Chromium (Cr)		24.6	24.2		ug/g	1.4	30	21-SEP-18
Cobalt (Co)		14.4	14.1		ug/g	2.0	30	21-SEP-18
Copper (Cu)		8.04	7.94		ug/g	1.3	30	21-SEP-18
Lead (Pb)		6.78	6.97		ug/g	2.8	40	21-SEP-18
Molybdenum (Mo)		0.91	0.90		ug/g	0.8	40	21-SEP-18
Nickel (Ni)		31.4	30.9		ug/g	1.6	30	21-SEP-18
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	21-SEP-18
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	21-SEP-18
Thallium (Tl)		0.103	0.104		ug/g	1.4	30	21-SEP-18
Uranium (U)		0.704	0.713		ug/g	1.2	30	21-SEP-18
Vanadium (V)		31.1	31.2		ug/g	0.3	30	21-SEP-18
Zinc (Zn)		62.8	63.4		ug/g	0.9	30	21-SEP-18
WG2881349-4 LCS								
Antimony (Sb)			106.4		%		80-120	21-SEP-18
Arsenic (As)			108.0		%		80-120	21-SEP-18
Barium (Ba)			99.1		%		80-120	21-SEP-18
Beryllium (Be)			109.3		%		80-120	21-SEP-18
Boron (B)			94.5		%		80-120	21-SEP-18
Cadmium (Cd)			101.9		%		80-120	21-SEP-18
Chromium (Cr)			107.3		%		80-120	21-SEP-18
Cobalt (Co)			104.4		%		80-120	21-SEP-18
Copper (Cu)			105.3		%		80-120	21-SEP-18
Lead (Pb)			106.2		%		80-120	21-SEP-18
Molybdenum (Mo)			105.3		%		80-120	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R4230295								
WG2881349-4 LCS								
Nickel (Ni)			104.7		%		80-120	21-SEP-18
Selenium (Se)			105.2		%		80-120	21-SEP-18
Silver (Ag)			98.2		%		80-120	21-SEP-18
Thallium (Tl)			107.4		%		80-120	21-SEP-18
Uranium (U)			106.7		%		80-120	21-SEP-18
Vanadium (V)			109.7		%		80-120	21-SEP-18
Zinc (Zn)			102.7		%		80-120	21-SEP-18
WG2881349-1 MB								
Antimony (Sb)			<0.10		mg/kg		0.1	21-SEP-18
Arsenic (As)			<0.10		mg/kg		0.1	21-SEP-18
Barium (Ba)			<0.50		mg/kg		0.5	21-SEP-18
Beryllium (Be)			<0.10		mg/kg		0.1	21-SEP-18
Boron (B)			<5.0		mg/kg		5	21-SEP-18
Cadmium (Cd)			<0.020		mg/kg		0.02	21-SEP-18
Chromium (Cr)			<0.50		mg/kg		0.5	21-SEP-18
Cobalt (Co)			<0.10		mg/kg		0.1	21-SEP-18
Copper (Cu)			<0.50		mg/kg		0.5	21-SEP-18
Lead (Pb)			<0.50		mg/kg		0.5	21-SEP-18
Molybdenum (Mo)			<0.10		mg/kg		0.1	21-SEP-18
Nickel (Ni)			<0.50		mg/kg		0.5	21-SEP-18
Selenium (Se)			<0.20		mg/kg		0.2	21-SEP-18
Silver (Ag)			<0.10		mg/kg		0.1	21-SEP-18
Thallium (Tl)			<0.050		mg/kg		0.05	21-SEP-18
Uranium (U)			<0.050		mg/kg		0.05	21-SEP-18
Vanadium (V)			<0.20		mg/kg		0.2	21-SEP-18
Zinc (Zn)			<2.0		mg/kg		2	21-SEP-18
MOISTURE-WT	**Soil**							
Batch R4229668								
WG2882003-3 DUP		**L2165631-17**						
% Moisture		24.9	24.8		%	0.7	20	21-SEP-18
WG2882003-2 LCS								
% Moisture			99.8		%		90-110	21-SEP-18
WG2882003-1 MB								
% Moisture			<0.10		%		0.1	21-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-WT	**Soil**							
Batch R4229691								
WG2881994-3 DUP		**L2165519-4**						
% Moisture		16.0	15.5		%	3.2	20	21-SEP-18
WG2881994-2 LCS								
% Moisture			99.9		%		90-110	21-SEP-18
WG2881994-1 MB								
% Moisture			<0.10		%		0.1	21-SEP-18
PAH-511-WT	**Soil**							
Batch R4226415								
WG2880188-4 DUP		**WG2880188-3**						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-SEP-18
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Benzo(b)fluoranthene		<0.050	0.063	RPD-NA	ug/g	N/A	40	20-SEP-18
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Fluoranthene		<0.050	0.093	RPD-NA	ug/g	N/A	40	20-SEP-18
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-SEP-18
Naphthalene		<0.013	0.022	RPD-NA	ug/g	N/A	40	20-SEP-18
Phenanthrene		<0.046	0.074	RPD-NA	ug/g	N/A	40	20-SEP-18
Pyrene		<0.050	0.071	RPD-NA	ug/g	N/A	40	20-SEP-18
WG2880188-2 LCS								
1-Methylnaphthalene			88.4		%		50-140	20-SEP-18
2-Methylnaphthalene			88.5		%		50-140	20-SEP-18
Acenaphthene			78.4		%		50-140	20-SEP-18
Acenaphthylene			80.2		%		50-140	20-SEP-18
Anthracene			87.0		%		50-140	20-SEP-18
Benzo(a)anthracene			86.6		%		50-140	20-SEP-18
Benzo(a)pyrene			89.7		%		50-140	20-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4226415								
WG2880188-2 LCS								
Benzo(b)fluoranthene			95.3		%		50-140	20-SEP-18
Benzo(g,h,i)perylene			74.2		%		50-140	20-SEP-18
Benzo(k)fluoranthene			99.3		%		50-140	20-SEP-18
Chrysene			87.5		%		50-140	20-SEP-18
Dibenzo(ah)anthracene			79.9		%		50-140	20-SEP-18
Fluoranthene			100.6		%		50-140	20-SEP-18
Fluorene			74.3		%		50-140	20-SEP-18
Indeno(1,2,3-cd)pyrene			81.4		%		50-140	20-SEP-18
Naphthalene			89.3		%		50-140	20-SEP-18
Phenanthrene			89.7		%		50-140	20-SEP-18
Pyrene			102.3		%		50-140	20-SEP-18
WG2880188-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	20-SEP-18
Acenaphthene			<0.050		ug/g		0.05	20-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	20-SEP-18
Anthracene			<0.050		ug/g		0.05	20-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	20-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	20-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-SEP-18
Chrysene			<0.050		ug/g		0.05	20-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-SEP-18
Fluoranthene			<0.050		ug/g		0.05	20-SEP-18
Fluorene			<0.050		ug/g		0.05	20-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-SEP-18
Naphthalene			<0.013		ug/g		0.013	20-SEP-18
Phenanthrene			<0.046		ug/g		0.046	20-SEP-18
Pyrene			<0.050		ug/g		0.05	20-SEP-18
Surrogate: 2-Fluorobiphenyl			86.2		%		50-140	20-SEP-18
Surrogate: p-Terphenyl d14			90.6		%		50-140	20-SEP-18
WG2880188-5 MS		**WG2880188-3**						
1-Methylnaphthalene			90.0		%		50-140	20-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4226415								
WG2880188-5 MS		**WG2880188-3**						
2-Methylnaphthalene			90.6		%		50-140	20-SEP-18
Acenaphthene			84.5		%		50-140	20-SEP-18
Acenaphthylene			82.3		%		50-140	20-SEP-18
Anthracene			86.7		%		50-140	20-SEP-18
Benzo(a)anthracene			92.2		%		50-140	20-SEP-18
Benzo(a)pyrene			90.7		%		50-140	20-SEP-18
Benzo(b)fluoranthene			97.4		%		50-140	20-SEP-18
Benzo(g,h,i)perylene			71.6		%		50-140	20-SEP-18
Benzo(k)fluoranthene			99.1		%		50-140	20-SEP-18
Chrysene			88.0		%		50-140	20-SEP-18
Dibenzo(ah)anthracene			78.4		%		50-140	20-SEP-18
Fluoranthene			78.9		%		50-140	20-SEP-18
Fluorene			87.8		%		50-140	20-SEP-18
Indeno(1,2,3-cd)pyrene			83.8		%		50-140	20-SEP-18
Naphthalene			88.7		%		50-140	20-SEP-18
Phenanthrene			90.9		%		50-140	20-SEP-18
Pyrene			78.5		%		50-140	20-SEP-18
Batch R4235435								
WG2881865-3 DUP		**WG2881865-5**						
1-Methylnaphthalene		0.337	0.323		ug/g	4.3	40	24-SEP-18
2-Methylnaphthalene		0.395	0.399		ug/g	1.0	40	24-SEP-18
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	24-SEP-18
Acenaphthylene		0.822	0.737		ug/g	11	40	24-SEP-18
Anthracene		0.386	0.367		ug/g	5.0	40	24-SEP-18
Benzo(a)anthracene		1.88	1.84		ug/g	1.9	40	24-SEP-18
Benzo(a)pyrene		1.50	1.49		ug/g	0.9	40	24-SEP-18
Benzo(b)fluoranthene		3.55	3.55		ug/g	0.0	40	24-SEP-18
Benzo(g,h,i)perylene		1.20	1.23		ug/g	2.3	40	24-SEP-18
Benzo(k)fluoranthene		1.21	1.23		ug/g	1.6	40	24-SEP-18
Chrysene		2.25	2.27		ug/g	1.0	40	24-SEP-18
Dibenzo(ah)anthracene		0.371	0.367		ug/g	1.1	40	24-SEP-18
Fluoranthene		2.80	2.80		ug/g	0.3	40	24-SEP-18
Fluorene		0.087	0.052	J	ug/g	0.035	0.1	24-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4235435								
WG2881865-3 DUP		**WG2881865-5**						
Indeno(1,2,3-cd)pyrene		1.35	1.34		ug/g	0.2	40	24-SEP-18
Naphthalene		0.286	0.409		ug/g	35	40	24-SEP-18
Phenanthrene		0.772	0.673		ug/g	14	40	24-SEP-18
Pyrene		2.54	2.42		ug/g	4.8	40	24-SEP-18
WG2881865-2 LCS								
1-Methylnaphthalene			88.4		%		50-140	24-SEP-18
2-Methylnaphthalene			88.7		%		50-140	24-SEP-18
Acenaphthene			89.2		%		50-140	24-SEP-18
Acenaphthylene			86.7		%		50-140	24-SEP-18
Anthracene			86.9		%		50-140	24-SEP-18
Benzo(a)anthracene			87.5		%		50-140	24-SEP-18
Benzo(a)pyrene			85.0		%		50-140	24-SEP-18
Benzo(b)fluoranthene			84.6		%		50-140	24-SEP-18
Benzo(g,h,i)perylene			50.2		%		50-140	24-SEP-18
Benzo(k)fluoranthene			93.7		%		50-140	24-SEP-18
Chrysene			88.5		%		50-140	24-SEP-18
Dibenzo(ah)anthracene			69.8		%		50-140	24-SEP-18
Fluoranthene			106.6		%		50-140	24-SEP-18
Fluorene			80.7		%		50-140	24-SEP-18
Indeno(1,2,3-cd)pyrene			65.7		%		50-140	24-SEP-18
Naphthalene			90.2		%		50-140	24-SEP-18
Phenanthrene			88.9		%		50-140	24-SEP-18
Pyrene			104.3		%		50-140	24-SEP-18
WG2881865-1 MB								
1-Methylnaphthalene			<0.030		ug/g		0.03	24-SEP-18
2-Methylnaphthalene			<0.030		ug/g		0.03	24-SEP-18
Acenaphthene			<0.050		ug/g		0.05	24-SEP-18
Acenaphthylene			<0.050		ug/g		0.05	24-SEP-18
Anthracene			<0.050		ug/g		0.05	24-SEP-18
Benzo(a)anthracene			<0.050		ug/g		0.05	24-SEP-18
Benzo(a)pyrene			<0.050		ug/g		0.05	24-SEP-18
Benzo(b)fluoranthene			<0.050		ug/g		0.05	24-SEP-18
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	24-SEP-18
Benzo(k)fluoranthene			<0.050		ug/g		0.05	24-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	**Soil**							
Batch R4235435								
WG2881865-1 MB								
Chrysene			<0.050		ug/g		0.05	24-SEP-18
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	24-SEP-18
Fluoranthene			<0.050		ug/g		0.05	24-SEP-18
Fluorene			<0.050		ug/g		0.05	24-SEP-18
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	24-SEP-18
Naphthalene			<0.013		ug/g		0.013	24-SEP-18
Phenanthrene			<0.046		ug/g		0.046	24-SEP-18
Pyrene			<0.050		ug/g		0.05	24-SEP-18
Surrogate: 2-Fluorobiphenyl			89.2		%		50-140	24-SEP-18
Surrogate: p-Terphenyl d14			115.0		%		50-140	24-SEP-18
WG2881865-4 MS		**WG2881865-5**						
1-Methylnaphthalene			96.6		%		50-140	24-SEP-18
2-Methylnaphthalene			97.2		%		50-140	24-SEP-18
Acenaphthene			98.0		%		50-140	24-SEP-18
Acenaphthylene			85.7		%		50-140	24-SEP-18
Anthracene			73.7		%		50-140	24-SEP-18
Benzo(a)anthracene			N/A	MS-B	%		-	24-SEP-18
Benzo(a)pyrene			N/A	MS-B	%		-	24-SEP-18
Benzo(b)fluoranthene			N/A	MS-B	%		-	24-SEP-18
Benzo(g,h,i)perylene			N/A	MS-B	%		-	24-SEP-18
Benzo(k)fluoranthene			N/A	MS-B	%		-	24-SEP-18
Chrysene			N/A	MS-B	%		-	24-SEP-18
Dibenzo(ah)anthracene			92.9		%		50-140	24-SEP-18
Fluoranthene			N/A	MS-B	%		-	24-SEP-18
Fluorene			91.2		%		50-140	24-SEP-18
Indeno(1,2,3-cd)pyrene			N/A	MS-B	%		-	24-SEP-18
Naphthalene			87.5		%		50-140	24-SEP-18
Phenanthrene			59.6		%		50-140	24-SEP-18
Pyrene			N/A	MS-B	%		-	24-SEP-18
PH-WT	**Soil**							
Batch R4230778								
WG2881474-1 DUP		**L2165511-4**						
pH		7.19	7.35	J	pH units	0.16	0.3	21-SEP-18
WG2882703-1 LCS								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Soil**							
Batch R4230778								
WG2882703-1 LCS								
pH			6.92		pH units		6.9-7.1	21-SEP-18
SAR-R511-WT	**Soil**							
Batch R4227609								
WG2881373-4 DUP		**WG2881373-3**						
Calcium (Ca)		3.0	3.0		mg/L	1.4	30	20-SEP-18
Sodium (Na)		10.6	10.3		mg/L	2.9	30	20-SEP-18
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	30	20-SEP-18
WG2881373-2 IRM		**WT SAR2**						
Calcium (Ca)			90.0		%		70-130	20-SEP-18
Sodium (Na)			89.4		%		70-130	20-SEP-18
Magnesium (Mg)			86.2		%		70-130	20-SEP-18
WG2881373-1 MB								
Calcium (Ca)			<1.0		mg/L		1	20-SEP-18
Sodium (Na)			<1.0		mg/L		1	20-SEP-18
Magnesium (Mg)			<1.0		mg/L		1	20-SEP-18
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-4 DUP		**WG2879176-3**						
1,1,1,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,2,2-Tetrachloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,1-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1,2-Trichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,1-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dibromoethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dichloroethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,2-Dichloropropane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,3-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
1,4-Dichlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Acetone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	19-SEP-18
Bromodichloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-4 DUP		**WG2879176-3**						
Bromoform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Bromomethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Carbon tetrachloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Chlorobenzene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Chloroform		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
cis-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
cis-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Dibromochloromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Dichlorodifluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	19-SEP-18
n-Hexane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Methylene Chloride		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
MTBE		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Methyl Ethyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
Methyl Isobutyl Ketone		<0.50	<0.50	RPD-NA	ug/g	N/A	40	19-SEP-18
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
Styrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Tetrachloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	19-SEP-18
trans-1,2-Dichloroethylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
trans-1,3-Dichloropropene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	19-SEP-18
Trichloroethylene		<0.010	<0.010	RPD-NA	ug/g	N/A	40	19-SEP-18
Trichlorofluoromethane		<0.050	<0.050	RPD-NA	ug/g	N/A	40	19-SEP-18
Vinyl chloride		<0.020	<0.020	RPD-NA	ug/g	N/A	40	19-SEP-18
WG2879176-2 LCS								
1,1,1,2-Tetrachloroethane			109.4		%		60-130	18-SEP-18
1,1,2,2-Tetrachloroethane			103.2		%		60-130	18-SEP-18
1,1,1-Trichloroethane			106.2		%		60-130	18-SEP-18
1,1,2-Trichloroethane			110.6		%		60-130	18-SEP-18
1,1-Dichloroethane			99.3		%		60-130	18-SEP-18
1,1-Dichloroethylene			92.1		%		60-130	18-SEP-18
1,2-Dibromoethane			115.5		%		70-130	18-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-2 LCS								
1,2-Dichlorobenzene			113.2		%		70-130	18-SEP-18
1,2-Dichloroethane			121.2		%		60-130	18-SEP-18
1,2-Dichloropropane			103.6		%		70-130	18-SEP-18
1,3-Dichlorobenzene			110.7		%		70-130	18-SEP-18
1,4-Dichlorobenzene			113.3		%		70-130	18-SEP-18
Acetone			131.2		%		60-140	18-SEP-18
Benzene			105.0		%		70-130	18-SEP-18
Bromodichloromethane			114.5		%		50-140	18-SEP-18
Bromoform			116.5		%		70-130	18-SEP-18
Bromomethane			108.0		%		50-140	18-SEP-18
Carbon tetrachloride			106.5		%		70-130	18-SEP-18
Chlorobenzene			108.8		%		70-130	18-SEP-18
Chloroform			109.2		%		70-130	18-SEP-18
cis-1,2-Dichloroethylene			109.5		%		70-130	18-SEP-18
cis-1,3-Dichloropropene			117.7		%		70-130	18-SEP-18
Dibromochloromethane			115.0		%		60-130	18-SEP-18
Dichlorodifluoromethane			84.2		%		50-140	18-SEP-18
Ethylbenzene			104.7		%		70-130	18-SEP-18
n-Hexane			103.7		%		70-130	18-SEP-18
Methylene Chloride			106.5		%		70-130	18-SEP-18
MTBE			107.1		%		70-130	18-SEP-18
m+p-Xylenes			106.4		%		70-130	18-SEP-18
Methyl Ethyl Ketone			134.2		%		60-140	18-SEP-18
Methyl Isobutyl Ketone			120.4		%		60-140	18-SEP-18
o-Xylene			106.6		%		70-130	18-SEP-18
Styrene			114.2		%		70-130	18-SEP-18
Tetrachloroethylene			105.0		%		60-130	18-SEP-18
Toluene			101.9		%		70-130	18-SEP-18
trans-1,2-Dichloroethylene			101.3		%		60-130	18-SEP-18
trans-1,3-Dichloropropene			118.9		%		70-130	18-SEP-18
Trichloroethylene			113.8		%		60-130	18-SEP-18
Trichlorofluoromethane			106.0		%		50-140	18-SEP-18
Vinyl chloride			92.1		%		60-140	18-SEP-18
WG2879176-1 MB								

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-1 MB								
1,1,1,2-Tetrachloroethane			<0.050		ug/g		0.05	18-SEP-18
1,1,2,2-Tetrachloroethane			<0.050		ug/g		0.05	18-SEP-18
1,1,1-Trichloroethane			<0.050		ug/g		0.05	18-SEP-18
1,1,2-Trichloroethane			<0.050		ug/g		0.05	18-SEP-18
1,1-Dichloroethane			<0.050		ug/g		0.05	18-SEP-18
1,1-Dichloroethylene			<0.050		ug/g		0.05	18-SEP-18
1,2-Dibromoethane			<0.050		ug/g		0.05	18-SEP-18
1,2-Dichlorobenzene			<0.050		ug/g		0.05	18-SEP-18
1,2-Dichloroethane			<0.050		ug/g		0.05	18-SEP-18
1,2-Dichloropropane			<0.050		ug/g		0.05	18-SEP-18
1,3-Dichlorobenzene			<0.050		ug/g		0.05	18-SEP-18
1,4-Dichlorobenzene			<0.050		ug/g		0.05	18-SEP-18
Acetone			<0.50		ug/g		0.5	18-SEP-18
Benzene			<0.0068		ug/g		0.0068	18-SEP-18
Bromodichloromethane			<0.050		ug/g		0.05	18-SEP-18
Bromoform			<0.050		ug/g		0.05	18-SEP-18
Bromomethane			<0.050		ug/g		0.05	18-SEP-18
Carbon tetrachloride			<0.050		ug/g		0.05	18-SEP-18
Chlorobenzene			<0.050		ug/g		0.05	18-SEP-18
Chloroform			<0.050		ug/g		0.05	18-SEP-18
cis-1,2-Dichloroethylene			<0.050		ug/g		0.05	18-SEP-18
cis-1,3-Dichloropropene			<0.030		ug/g		0.03	18-SEP-18
Dibromochloromethane			<0.050		ug/g		0.05	18-SEP-18
Dichlorodifluoromethane			<0.050		ug/g		0.05	18-SEP-18
Ethylbenzene			<0.018		ug/g		0.018	18-SEP-18
n-Hexane			<0.050		ug/g		0.05	18-SEP-18
Methylene Chloride			<0.050		ug/g		0.05	18-SEP-18
MTBE			<0.050		ug/g		0.05	18-SEP-18
m+p-Xylenes			<0.030		ug/g		0.03	18-SEP-18
Methyl Ethyl Ketone			<0.50		ug/g		0.5	18-SEP-18
Methyl Isobutyl Ketone			<0.50		ug/g		0.5	18-SEP-18
o-Xylene			<0.020		ug/g		0.02	18-SEP-18
Styrene			<0.050		ug/g		0.05	18-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-1 MB								
Tetrachloroethylene			<0.050		ug/g		0.05	18-SEP-18
Toluene			<0.080		ug/g		0.08	18-SEP-18
trans-1,2-Dichloroethylene			<0.050		ug/g		0.05	18-SEP-18
trans-1,3-Dichloropropene			<0.030		ug/g		0.03	18-SEP-18
Trichloroethylene			<0.010		ug/g		0.01	18-SEP-18
Trichlorofluoromethane			<0.050		ug/g		0.05	18-SEP-18
Vinyl chloride			<0.020		ug/g		0.02	18-SEP-18
Surrogate: 1,4-Difluorobenzene			112.8		%		50-140	18-SEP-18
Surrogate: 4-Bromofluorobenzene			112.9		%		50-140	18-SEP-18
WG2879176-5 MS		**L2165622-10**						
1,1,1,2-Tetrachloroethane			120.5		%		50-140	19-SEP-18
1,1,2,2-Tetrachloroethane			113.4		%		50-140	19-SEP-18
1,1,1-Trichloroethane			118.7		%		50-140	19-SEP-18
1,1,2-Trichloroethane			122.3		%		50-140	19-SEP-18
1,1-Dichloroethane			106.7		%		50-140	19-SEP-18
1,1-Dichloroethylene			98.7		%		50-140	19-SEP-18
1,2-Dibromoethane			128.1		%		50-140	19-SEP-18
1,2-Dichlorobenzene			118.8		%		50-140	19-SEP-18
1,2-Dichloroethane			137.3		%		50-140	19-SEP-18
1,2-Dichloropropane			109.9		%		50-140	19-SEP-18
1,3-Dichlorobenzene			112.5		%		50-140	19-SEP-18
1,4-Dichlorobenzene			115.5		%		50-140	19-SEP-18
Acetone			169.6	RRQC	%		50-140	19-SEP-18
Benzene			112.3		%		50-140	19-SEP-18
Bromodichloromethane			127.5		%		50-140	19-SEP-18
Bromoform			135.0		%		50-140	19-SEP-18
Bromomethane			110.4		%		50-140	19-SEP-18
Carbon tetrachloride			119.7		%		50-140	19-SEP-18
Chlorobenzene			117.8		%		50-140	19-SEP-18
Chloroform			120.6		%		50-140	19-SEP-18
cis-1,2-Dichloroethylene			118.8		%		50-140	19-SEP-18
cis-1,3-Dichloropropene			112.7		%		50-140	19-SEP-18
Dibromochloromethane			129.4		%		50-140	19-SEP-18
Dichlorodifluoromethane			87.8		%		50-140	19-SEP-18

Quality Control Report

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-511-HS-WT	**Soil**							
Batch R4221652								
WG2879176-5 MS		**L2165622-10**						
Ethylbenzene			110.9		%		50-140	19-SEP-18
n-Hexane			109.0		%		50-140	19-SEP-18
Methylene Chloride			115.7		%		50-140	19-SEP-18
MTBE			115.1		%		50-140	19-SEP-18
m+p-Xylenes			112.5		%		50-140	19-SEP-18
Methyl Ethyl Ketone			153.1	RRQC	%		50-140	19-SEP-18
Methyl Isobutyl Ketone			133.4		%		50-140	19-SEP-18
o-Xylene			113.9		%		50-140	19-SEP-18
Styrene			120.8		%		50-140	19-SEP-18
Tetrachloroethylene			113.6		%		50-140	19-SEP-18
Toluene			108.8		%		50-140	19-SEP-18
trans-1,2-Dichloroethylene			104.9		%		50-140	19-SEP-18
trans-1,3-Dichloropropene			113.6		%		50-140	19-SEP-18
Trichloroethylene			124.3		%		50-140	19-SEP-18
Trichlorofluoromethane			118.3		%		50-140	19-SEP-18
Vinyl chloride			94.9		%		50-140	19-SEP-18

COMMENTS: Matrix spike recovery was above ALS DQO. LCS results were acceptable.

Quality Control Report

Workorder: L2165631 Report Date: 26-SEP-18

Client: SNC- Lavalin Inc. (Sudbury/Toronto)
1005 SKYVIEW DRIVE
BURLINGTON ON L7P 5B1
Contact: LEON BURGER

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

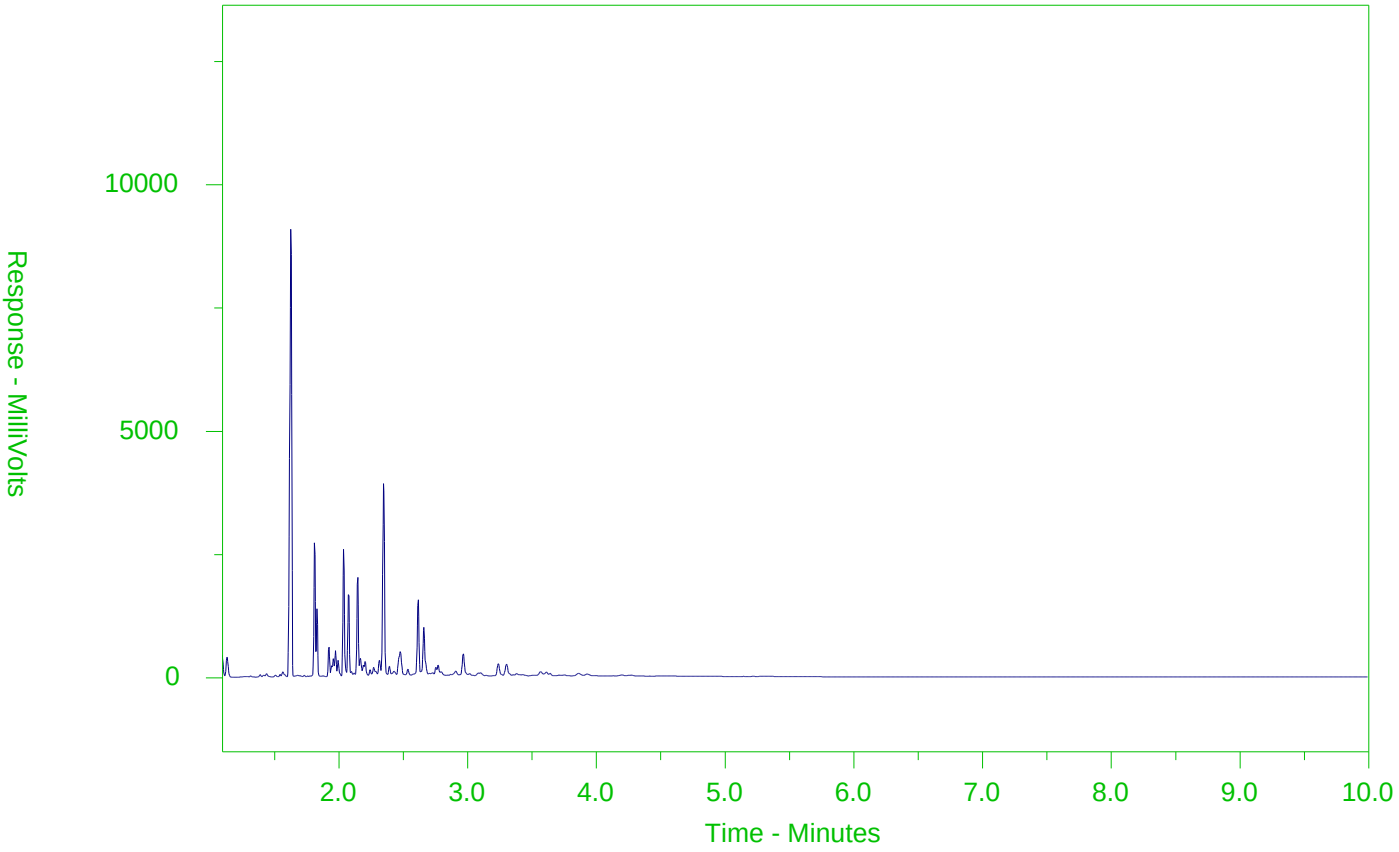
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-3
Client Sample ID: BH18-27-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

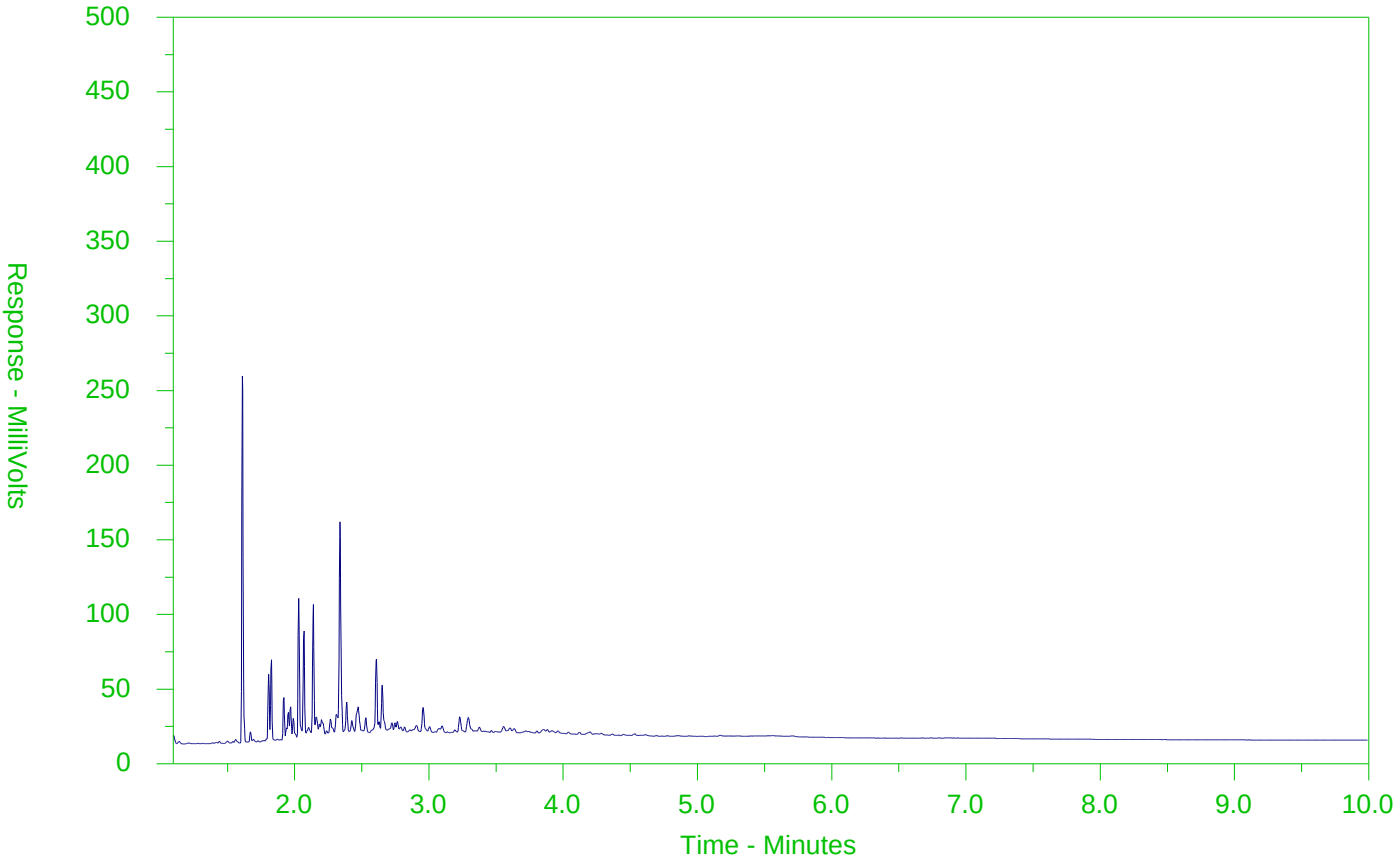
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-6
Client Sample ID: BH18-27-14



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

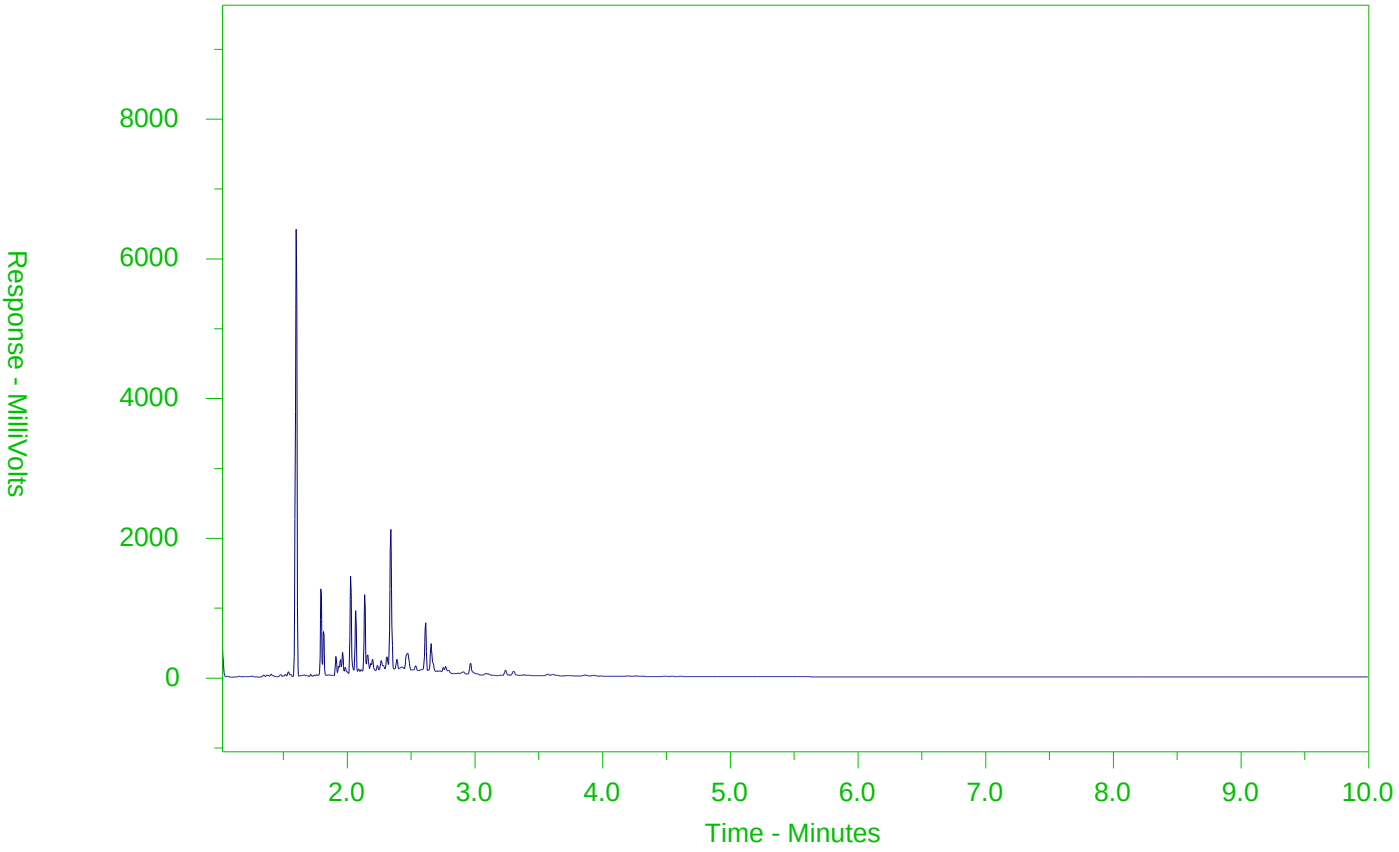
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-8
Client Sample ID: BH18-28-5



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

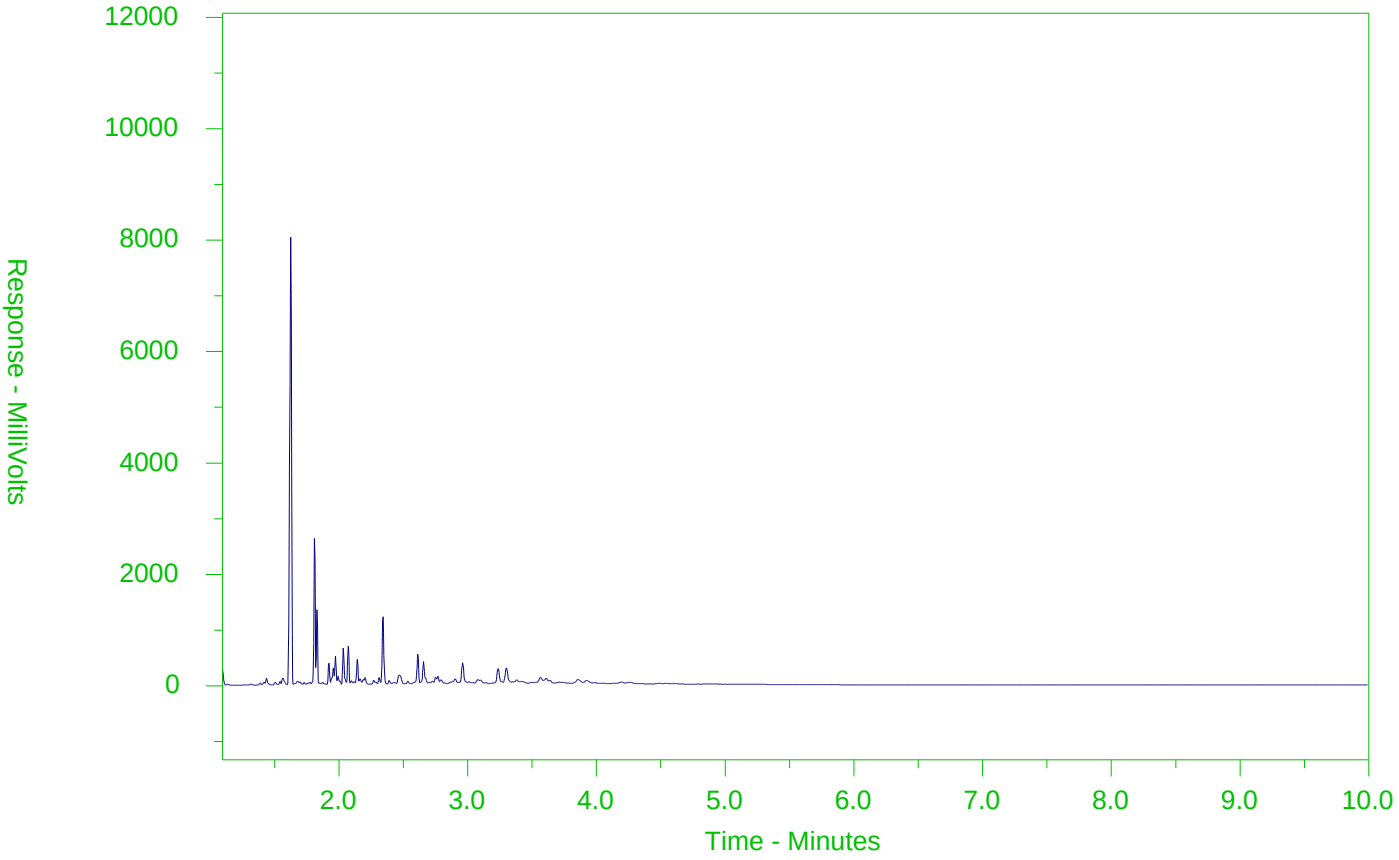
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-9
Client Sample ID: BH18-28-9



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

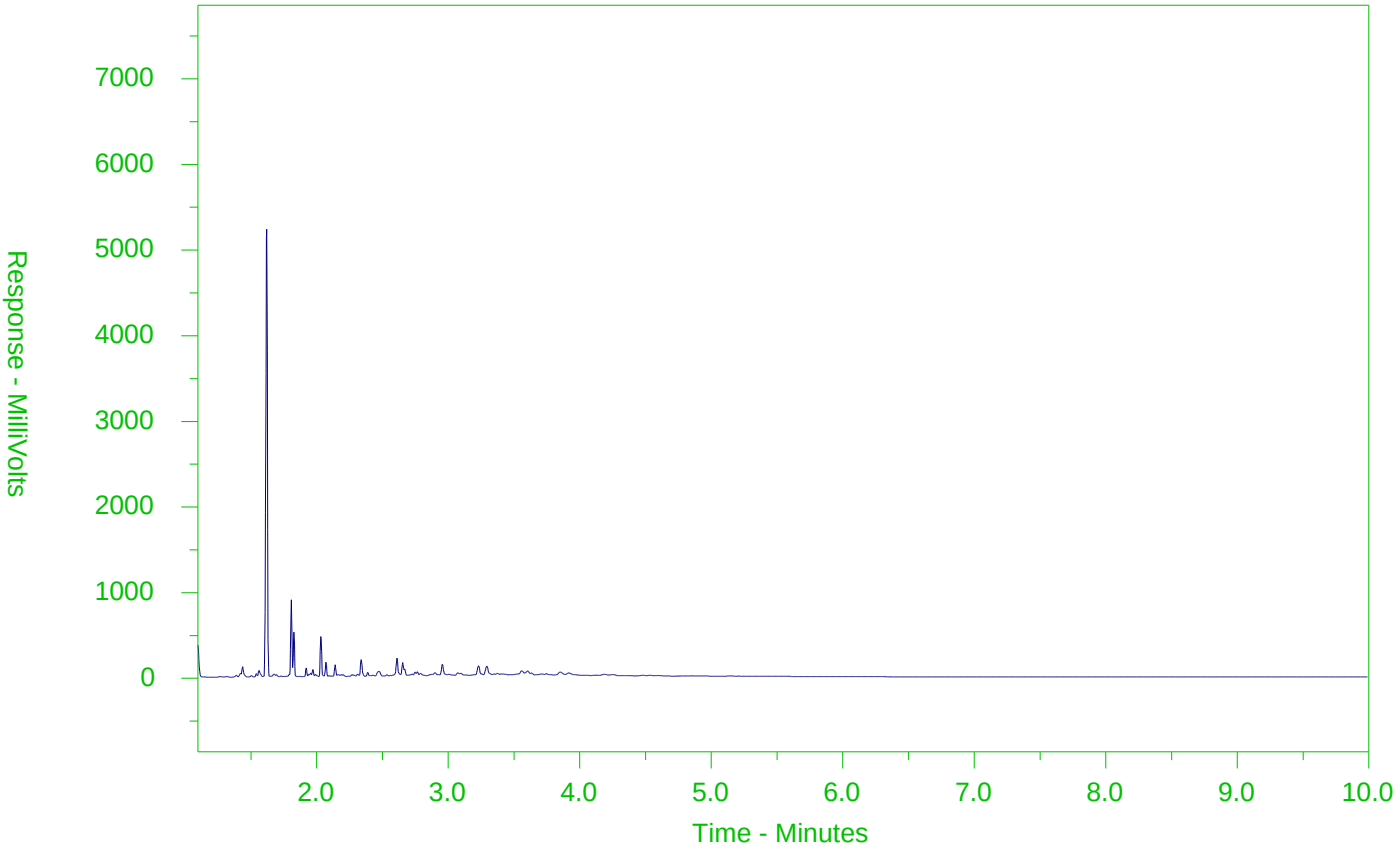
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-12
Client Sample ID: BH18-29-3



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

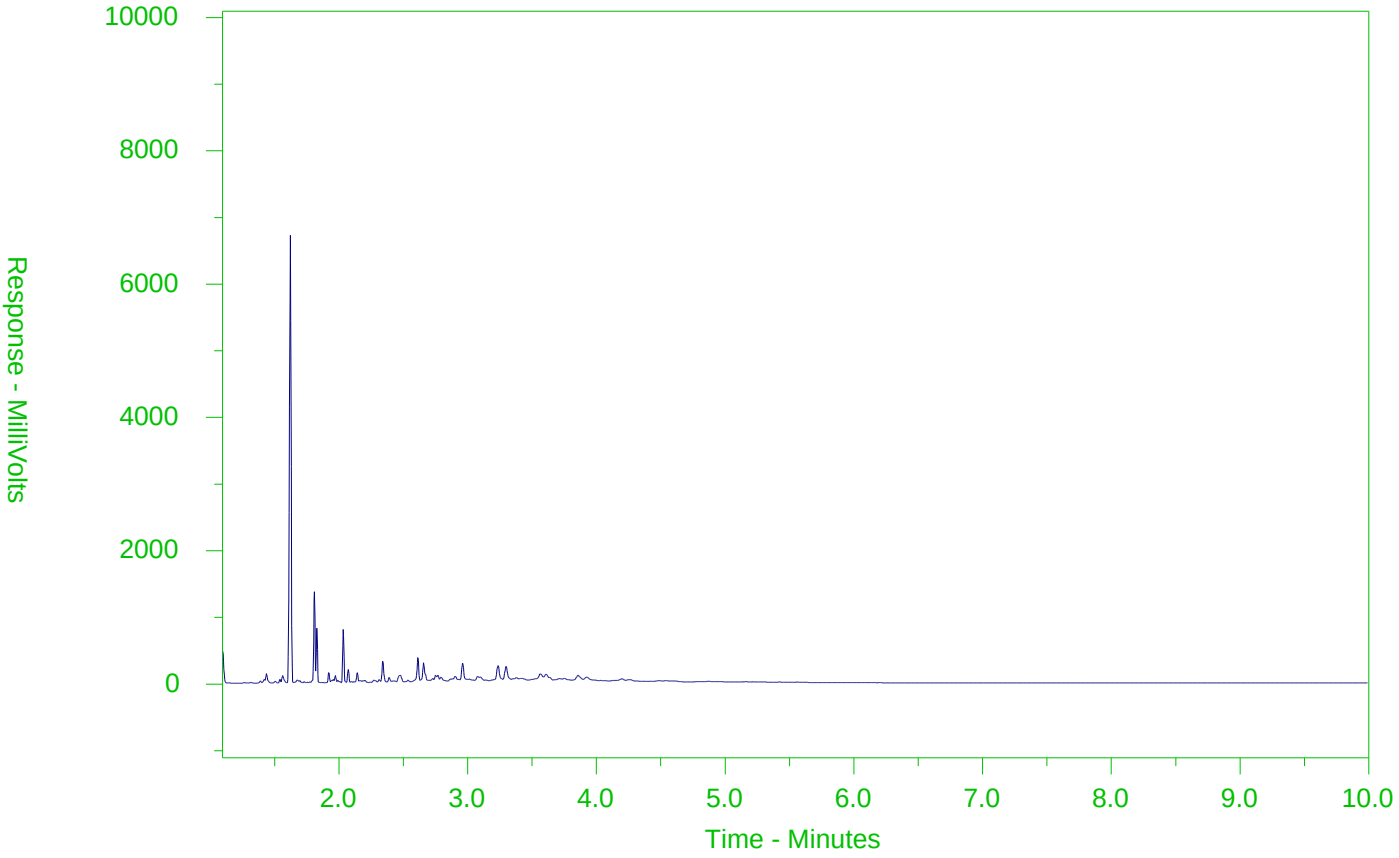
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-13
Client Sample ID: BH18-29-33



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

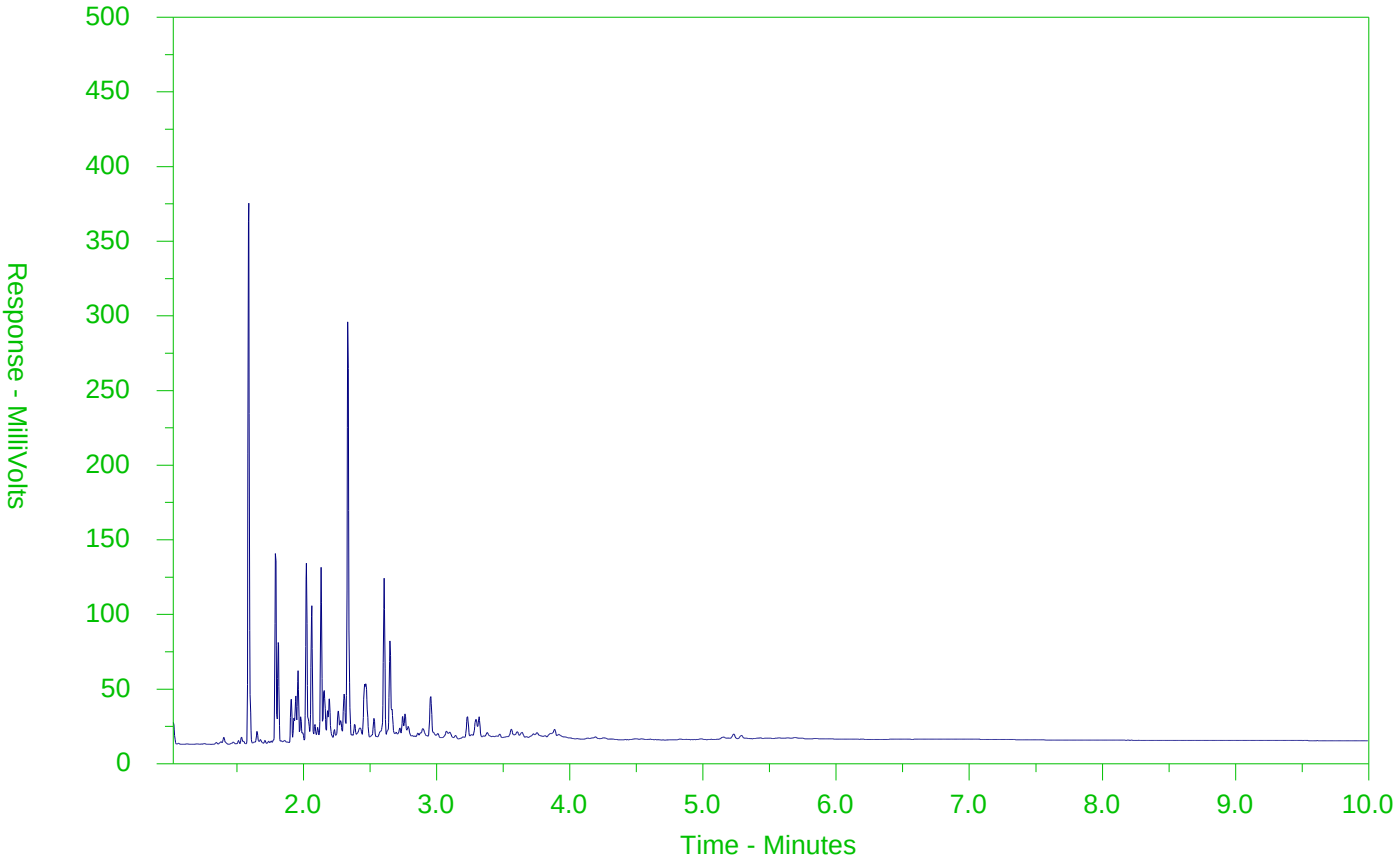
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2165631-17
Client Sample ID: BH18-29-12



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.