Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment, Site 212, Border Beacon, NL

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Executive Summary

Stassinu Stantec Limited Partnership (Stantec) was retained by Newfoundland and Labrador Department of Municipal Affairs and Environment (NLDMAE) to conduct a Phase III Environmental Site Assessment (ESA) and Human Health and Ecological Risk Assessment (HHERA) at the former military site located at Border Beacon, Newfoundland and Labrador (NL) (see Drawing Nos. 121414998-EE-01 to 121414998-EE-03 in Appendix A), herein referred to as the "Site". The purpose of the Phase III ESA and HHERA investigations was to further delineate environmental conditions of the property. The purpose of the HHERA is to evaluate the potential for adverse health outcomes from both short-term (acute) exposures and long-term (chronic) exposures resulting from the interactions between ecological and human receptors and chemicals found in the environment. It is our understanding that NLDMAE has a requirement to assess the former military site at Border Beacon to collect the information necessary to be eligible for Federal Contaminated Sites Action Plan (FCSAP) funding to further assess and/or remediate the Site as required.

Site Description

The former United States (U.S.) Military Mid Canada Line (MCL) Radar Site 212 known as Border Beacon is located approximately 190 km west of the Town of Hopedale, NL (see Drawing No. 121414998-EE-01 in Appendix A). Border Beacon consisted of an Upper Site, which contained radar equipment and ancillary support services, and a Lower Site along the shores of Ashuapun Lake which contained an airstrip, camp, antennae, fuel storage facility, and other support structures. The Lower Site acted as a supply area for the communications equipment located at the Upper Site. The investigated property has a combined area of approximately 100 ha. The Sites are remote and are accessible only by helicopter at the Upper Site and by bush plane or helicopter at the Lower Site.

Description of Site Work

Stantec's specific scope of work for achieving the project objectives, as per the Request for Proposal (RFP) prepared by NLDMAE for the former military site in Border Beacon, NL, was as follows:

- Target and delineate the boundaries of identified contaminants;
- Define, in greater detail, site conditions required to identify all contaminant pathways, particularly with respect to risk assessment;
- Provide contaminant and other information necessary to finalize remediation guidelines or risk assessment;
- Confirm or reclassify NCSCS scoring;
- Estimate / refine volumes and areas of impacted media;
- Finalize the conceptual site model;
- Provide all other information required to develop a Remedial Action Plan (RAP) and input to specifications and tender documents;
- Conduct applicable Risk Assessment Work;
- Remove and dispose of waste fuel and oil from tanks, drums, and containers.

Conclusions

Based on information gathered and observations made, the Phase III ESA has revealed evidence of actual environmental contamination associated with the Site. The findings and results of the Phase III ESA are summarized as follows:

1. The stratigraphy at the Upper Site consists generally of a silty sand till veneer with frequent cobbles and boulders directly overlying bedrock. The Lower Site is comprised of a glacial esker and was levelled off to form the gravel runway. The stratigraphy at the Lower Site consists generally of reworked sand and gravel likely disturbed during the construction of the airstrip. The current investigation indicate that this layer is generally underlain by thick stratified deposits of dense, light brown to grey, fine to medium grained glacio-fluvial silty sand with silt lensing. Bedrock was not encountered in boreholes at the Lower Site during the current investigation. However, discontinuous permafrost was encountered in several boreholes.
2. Concentrations of total petroleum hydrocarbons (TPH) in select soil, sediment, surface water, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

    a. Petroleum hydrocarbon impacts were identified in soil in exceedance of the applicable Atlantic Risk Based Corrective Action (RBCA) Tier I risk-based screening levels (RBSLs) and/or Tier I Ecological Screening Level (ESLs) for a commercial site with coarse grained soil, non-potable water and either gasoline/fuel oil/lube oil impacts at the Camp / Antenna Areas and AES Compound (13,745 m^3), Waste Disposal Sites (78 m^3), and Upper Site (59 m^3).
    b. Petroleum hydrocarbon impacts were identified in freshwater sediment in exceedance of the applicable Atlantic RBCA Tier I Sediment ESLs for the Protection of Freshwater and Marine Aquatic Life (Typical sediment) at the Waste Disposal Sites (23 m^3), Former Innu Camp (12 m^3), and Upper Site (5 m^3).
    c. Petroleum hydrocarbon impacts were identified in surface water in exceedance of the applicable Atlantic RBCA Tier I ESLs (freshwater and marine aquatic life) for fuel oil/lube oil impacts at the Waste Disposal Sites, but the areal extent of impacts was not assessed as part of the current investigation.
    d. Petroleum hydrocarbon impacts were identified in groundwater in exceedance of the applicable Atlantic RBCA Tier I RBSLs and/or Tier I ESLs for a commercial site with coarse grained soil, non-potable water and either gasoline/fuel oil/lube oil impacts at the Camp / Antenna Areas and AES Compound (3,359 m^2) and the Waste Disposal Sites (313 m^2).

3. Concentrations of polycyclic aromatic hydrocarbons (PAHs) in select soil, sediment, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

    a. PAH impacts were identified in soil in exceedance of the applicable CCME SQGs for the Protection of Environmental and Human Health for Commercial land use at the Camp / Antenna Areas and AES Compound (1,742 m^3) and the Waste Disposal Sites (78 m^3).
    b. PAH impacts were identified in freshwater sediment in exceedance of the applicable CCME PEL for Freshwater Sediment at the Upper Site (5 m^3).

c. PAH impacts were identified in groundwater in exceedance of the applicable AENV Groundwater Remediation Guideline values for commercial/industrial land use and non-potable groundwater at the Camp / Antenna Areas and AES Compound (3,359 m^2) and the Waste Disposal Sites (313 m^2).

4. Concentrations of metals in select soil, surface water, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

   a. Metals impacts were identified in surface soil in exceedance of the applicable Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use at the Camp / Antenna Areas and AES Compound (100 m^3) and the Upper Site (143 m^3).
   b. Metals impacts were identified in surface water in exceedance of the applicable CCME water quality guidelines (WQGs) for the protection of Freshwater Aquatic Life in the Lower Site – General Area, the Camp / Antenna Areas and AES Compound, the Unknown Foundation / Building, the Waste Disposal Sites, the Former Innu Camp, the General Dump Site, and the Upper Site, but the areal extent of impacts was not assessed as part of the current investigation.

5. Concentrations of polychlorinated biphenyls (PCBs) in one groundwater sample exceeded the applicable MOE Groundwater Standards for a Generic Site with non-potable groundwater at the Camp / Antenna Areas and AES Compound (313 m^2). It is suspected that the exceedance of PCBs in groundwater sample 2018-MW09 is likely associated with suspended solids due to low-level detected PCB concentrations in soil in the area based on sample BB-TP26-BS1 collected during the Phase II ESA.
6. The measured pH value of 2.75 in sample 2018-MW11 at the Camp / Antenna Areas and AES Compound is suspected to be the result of preservative cross-contamination during sample collection.
7. A total of approximately 5,000 L of product was recovered and incinerated and an additional 3,400 L of oily water was processed with the oil water separator.
8. Based on NCSCS scoring, both the Upper Site and Lower Site are classified as Class 2, indicating a medium priority for action.

Recommendations

1. It is recommended that liquid PHC product remaining in drums at the Site is removed and incinerated, and empty drums, including the ones stockpiled as part of the current investigation, are crushed and buried in the Drum Disposal Area (Site #1 of the Waste Disposal Sites).
2. It is recommended that two groundwater samples are collected from 2018-MW09 at the Camp / Antenna Areas and AES Compound for analysis of PCBs and Total Suspended Solids (TSS); one sample should be unfiltered, and one field filtered to determine the source of PCBs identified during the current investigation.
3. It is recommended that groundwater at 2018-MW11 at the Camp / Antenna Areas and AES Compound is re-sampled for pH to confirm the value measured from the Phase III ESA.
4. The HHRA was based on the current land use, non-potable groundwater use, and no occupied buildings (current or planned) within 5 m of the impacts. If land use changes or if development takes place on the site, the HHRA may require re-evaluation.
5. It is recommended that metals debris located on the Lower Site and the Upper Site, including debris present in the pools of standing water on the Lower Site, be removed.

6. It is recommended that surface soil in the area of the metals debris at the Upper Site be removed (i.e., in the area of samples 2018-SS47, 2018-SS46, BB-SS41, BB-TP44, and BB-SS48) and confirmatory soil samples be collected.

It is recommended that the analytical results from the Upper Site be incorporated into a re-evaluation of the ERA for the Upper Site.

Abbreviations

AENV	Alberta Environment
B[a]P TPE	Benzo(a)pyrene Total Potency Equivalent
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CCME	Canadian Council of Ministers of the Environment
CCME SQG	Canadian Council of Ministers of the Environment Soil Quality Guidelines
CCME WQG	Canadian Council of Ministers of the Environment Water Quality Guidelines
CEQG	Canadian Environmental Quality Guidelines
COPC	Chemical of potential concern
ESA	Environmental Site Assessment
FCSAP	Federal Contaminated Sites Action Plan
RBCA	Risk Based Corrective Action
RDL	Reportable detection limit
RPD	Relative percent difference
mbgs	meters below ground surface
MOE	Ontario Ministers of the Environment
MTBE	Methyl t-butyl ether
NLDMAE	Newfoundland and Labrador Department of Municipal Affairs and Environment
PHC	Petroleum Hydrocarbon
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
QA/QC	Quality assurance / quality control
Tier I ESL	Tier I Ecological Screening Level
Tier I RBSL	Tier I Risk Based Screening Level
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TPH Frac.	TPH Fractionation
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Stassinu Stantec Limited Partnership (Stantec) was retained by Newfoundland and Labrador Department of Municipal Affairs and Environment (NLDMAE) to conduct a Phase III Environmental Site Assessment (ESA) and Human Health and Ecological Risk Assessment (HHERA) at the former military site located at Border Beacon, Newfoundland and Labrador (NL) (see Drawing Nos. 121414998-EE-01 to 121414998-EE-03 in Appendix A), herein referred to as the "Site".

The purpose of the Phase III ESA was to further investigate environmental conditions of the property. The purpose of the HHERA was to review the information available from previous and current environmental investigations and evaluate the potential for human and ecological health risks associated with chemicals of potential concern (COPCs) at the site.

Stantec understands that that NLDMAE has a requirement to collect the information necessary to be eligible for Federal Contaminated Sites Action Plan (FCSAP) funding to further assess and/or remediate the Site as required.

1.1 Background

Based on the requirements of FCSAP funding, the assessment must follow the Federal Approach to Contaminated Sites (FACS) which follows a ten-step process. Under this approach, a Phase I ESA would first be completed to document site history and identify potential and/or actual environmental issues on or around the Site. A Phase I ESA would constitute Step 1 (Identify Suspect Sites) and Step 2 (Historical Review) of the FACS. A Phase II intrusive investigation would then be conducted to confirm the presence or absence of chemicals of potential concern (COPCs) in soil, groundwater, surface water, and sediment at potential areas of concern identified in the Phase I ESA for the purpose of defining environmental conditions on the property. A Phase II ESA would constitute Step 3 (Initial Testing), and the results may be used to complete the optional Step 4 (Canadian Council of the Ministers of the Environment (CCME) National Classification System for Contaminated Sites (NCSCS)). If further delineation is required, a Phase III ESA would constitute Step 5 (Detailed Testing), and the results used to support Step 6 (Re-classification if necessary), while a HHERA may be used to support Step 7 (Develop Risk Management Strategy).

Two Phase I ESAs previously conducted at the Site (JWEL, 1998, and GHD, 2016) identified the potential for several environmental issues associated with historical use and storage of petroleum hydrocarbons, solid waste, metals, chemical spills, preserved wood, and polychlorinated biphenyls (PCBs). As a result, Stantec was subsequently retained by NLDMAE to complete a Phase II ESA. Results of the Phase II ESA indicated impacts at several locations at the Site and Stantec was retained by NLDMAE to complete a Phase III ESA and HHERA.

1.2 Site Description

1.2.1 Property Description and Land Use

The former United States (U.S.) Military Mid Canada Line (MCL) Radar Site 212 known as Border Beacon is located approximately 190 km west of the Town of Hopedale, NL (see Drawing No. 121414998-EE-01 in Appendix A). Border Beacon consisted of an Upper Site, which contained radar equipment and ancillary support services, and a Lower Site along the shores of Ashuapun Lake, which contained an airstrip, camp, antennae, fuel storage facility, and other support structures. The Lower Site acted as a supply area for the communications equipment located at the Upper Site. The investigated property has a combined area of approximately 100 ha. The Sites are remote and are accessible only by helicopter at the Upper Site and by bush plane or helicopter at the Lower Site.

The Site was operated from the mid-1950s until 1964, when the Upper Site burned down. Since the shutdown in 1964, sections of the Lower Site were briefly used as a Transport Canada weather station, a hunting outfitter, and since 1992 an area northeast of the airstrip has been used as a seasonal Innu camp and healing center. Between 1994 and 1999, Department of National Defense operated a fuel cache along the southern edge of the airstrip. In 1998, the Province of Newfoundland and Labrador transferred administration and control of five (5) parcels of land at the Lower Site to Environment Canada for a weather station, including the length of the airstrip and a small area north of the airstrip. Further Details of historical land use for the Site are contained in Phase I ESAs (JWEL, 1998, and GHD, 2016).

Based on previous environmental reports and field work completed as part of the current investigation, the overall Site was divided into seven (7) smaller study areas for the purpose of the Phase III ESA and HHERA. These areas are summarized in Table 1.1 and their locations with respect to the overall Site are shown on Drawing Nos. 12414998-EE-02 and 121414998-EE-03 in Appendix A. In addition to the areas listed below, the boundaries of the land parcels granted to the Government of Canada at the Lower Site are shown in Drawing No. 121414998-EE-03. Sampling locations and COPC exceedances identified during the Phase II ESA are included in drawings for each area.

Table 1.1 Site Inventory

Area	Site Inventory	Drawing
Lower Site – General Area	Gravel airstrip, abandoned 3,540 L tank, Ashuapun Lake shoreline	Drawing No. 121414998-EE-03
Camp / Antenna Areas and atmospheric environment services (AES) Compound	Camp fuel shed building #1, 12 ASTs (4,500 L each), camp garage building #2, former re-fueling area, dyked 113,516 L tank, one (1) antenna, four (4) former antennae, one (1) cellular tower, two (2) former ASTs (4,546 L each), former camp building #3, shed, former above-ground septic tank, former camp building #4, AES building #1 storage, AES building #2 equipment	Drawing Nos. 121414998-EE-04 and 121414998-EE-05
Unknown Foundation / Building	East end of former airstrip, unknown foundation / building, Ashuapun Lake shoreline	Drawing No. 121414998-EE-06

Table 1.1 Site Inventory

Area	Site Inventory	Drawing
Waste Disposal Sites	Buried debris, drum / waste disposal site – Site #1, solid waste disposal area – Site #2, solid waste disposal area - Site #3 (trenches), former SAR drum storage area (former 3,456L SAR tanks), three (3) ponds	Drawing Nos. 121414998-EE-07 and 121414988-EE-08
Former Innu Camp	Construction debris (mostly lumber) and two (2) wooden buildings (empty).	Drawing No. 121414998-EE-09
General Dump Site	Scattered refuse surrounding an open pit, occasional drums (empty). Old abandoned tractor.	Drawing No. 121414998-EE-10
Upper Site	Three (3) former antenna towers, five (5) former diesel ASTs (6,818 L each), four (4) former diesel ASTs (9,547 L each), former operations building, former emergency shelter, buried metal debris, tower	Drawing No. 121414998-EE-11

1.2.2 Geology, Topography, and Drainage

Based on available surficial geology maps, the native surficial soils at the Site consist of a mixture of undifferentiated till at the Upper Site and glaciofluvial gravel and sand at the Lower Site (Klassen et. al., 1992). The characteristic permeability of these soils is moderate to high.

Based on observations made during the current and previous investigations, the stratigraphy at the Upper Site consists generally of a silty sand till veneer with frequent cobbles and boulders directly overlying bedrock. The Lower Site is comprised of a glacial esker and was levelled off to form the gravel runway. The stratigraphy at the Lower Site consists generally of reworked sand and gravel likely disturbed during the construction of the airstrip. The current investigation indicate that this layer is generally underlain by thick stratified deposits of dense, light brown to grey, fine to medium grained glacio-fluvial silty sand with silt lensing. Bedrock was not encountered in boreholes at the Lower Site during the current investigation. However, discontinuous permafrost was encountered in several boreholes.

Bedrock in the area consists of undifferentiated Archean and Paleoproterozoic metamorphic gneiss of the Southeastern Churchill Province (Wardle et. al., 1997). Exposed bedrock is common throughout the Upper Site.

The Lower Site is mainly located on a large, relatively flat-lying peninsula within Ashuapun Lake at an elevation of approximately 480 m above sea level (asl). The Upper Site is located at an elevation of 650 m asl and slopes steeply toward the south to an inlet feeding Ashuapun Lake.

1.2.3 Ecological Setting

1.2.3.1 Habitat

The Upper and Lower sites at Border Beacon are located within the High Subarctic Tundra - Kingurutik/Fraser Ecoregion (Meades 1990, NLFLR 2008). The climate is high subarctic and continental where summers are short and cool, with long, cold, and severe winters. This area is rugged, defined by high plateaus and mountains where vegetation is limited and found primarily in valleys. The plateaus have bare rock, alpine heath vegetation, and fens. The vegetation transitions from plateau to lower elevations through white birch (*Betula papyrifera*)-willow spp. (*Salix spp*.) on scree, to closed black spruce (*Picea mariana*) forests downslope, and open lichen woodland in the valley bottom. The open lichen woodlands have *Stereocaulon spp*. as the dominant lichen, rather than *Cladonia* and *Cladina spp*. found elsewhere provincially.

The ecological habitats were described within 200 m of the lower and upper sites referencing site observations, Google Earth, and Natural Resources Canada (NRCan) topographic maps (Table 1.2). The lower site is a low-lying area of open lichen woodland and shrub/thicket habitats. The dominant tree species in the open lichen woodland were balsam fir (*Abies balsamea*), black spruce, and larch (*Larix laricina*). Dwarf birch (*Betula glandulosa*), mountain alder (*Alnus viridis crispa*), and northern Labrador tea (*Rhododendron tomentosum*) is the dominant species in the mid-story. The ground layer is composed primarily of heath species including mountain cranberry (*Vaccinium vitis-idaea*), tundra bilberry (*Vaccinium uliginosum*), bearberry willow (*Salix uva-ursi*), alpine bearberry (*Arctostaphylos alpina*), and black crowberry (*Empetrum nigrum*). Among the heath species, there are lichens (*Stereocaulon spp*., *Cladina spp*., and *Cladonia spp*.), grasses spp., fireweed (*Chamerion angustifolium*), and moss (*Lycoopdium clavatum*). There are aquatic habitats present, mainly freshwater lakes and ponds. Anthropogenic disturbances cover a large proportion of the Lower Site which includes an air strip and infrastructure such as buildings.

The Upper Site is primarily a plateau of bare rock and alpine heath vegetation with forested depressions and slopes. The heath vegetation is black crowberry dominant interspersed with northern Labrador tea, lichens (*Stereocaulon spp*., *Cladina spp*., and *Cladonia spp*.), and grasses spp. The forested areas are composed of black spruce, balsam fir, larch, dwarf birch, and mountain alder.

Table 1.2 Ecological Habitat within 200 m of the Site

Habitat Type	Is Habitat Present?	Habitat Size (ha)	Data source
Wetland	There are wetlands within 200 m of the site.	< 1 ha	• Google Earth • Site observations • Topographic mapping – NRCan
Aquatic habitat	There are aquatic habitats within the lower site.	NA[1]	• Google Earth • Site observations • Topographic mapping – NRCan

Table 1.2 Ecological Habitat within 200 m of the Site

Habitat Type	Is Habitat Present?	Habitat Size (ha)	Data source
Forested habitats	There are open forested areas within 200 m of the site.	< 1 ha	• Google Earth • Site observations
Grassland habitats	Grassland habitats were not identified within 200 m.	None	• Google Earth • Site observations
Provincial parks, national parks, or ecological reserves	There are no provincial parks, national parks, or ecological reserves present.	None	• NLFLR 2008
Known rare, threatened or endangered species	None are known to occur within 200 m. Likelihood is low based on aerial imagery, as no unusual or rare habitat is evident. However, ACCDC was not consulted.	None	• Google Earth • Site observations
Other critical or sensitive habitat	No other environmentally sensitive areas are designated in the area.	None	• Google Earth • Site observations
Other local or regional receptor habitat concerns	No other receptor habitat concerns.	None	• Google Earth • Site observations

Notes:
1- No spatial criteria are suggested for aquatic habitat (Atlantic RBCA 2015)
ACCDC = Atlantic Canada Conservation Data Centre
NLFLR = Newfoundland and Labrador Department of Fisheries and Land Resources
NRCan = National Resources Canada

1.2.3.2 Wildlife

Meades (1990) and NLFLR (2008) list a variety of mammalian and avian species that occur in this area. One of the most characteristic wildlife species of this region is the caribou (*Rangifer tarandus*) which are part of the migratory George River Herd. The Border Beacon area is within the summer/fall ranges of the George River Herd. The gray wolf (*Canis lupus*) is also present in this area due to its dependency on caribou. Other species associated with the alpine heath habitat include arctic fox (*Vulpes Lagopus*), red fox (*Vulpes vulpes*), arctic hare (*Lepus arcticus*), and bog lemming (*Synaptomys borealis*). Birds species found in these habitats include rough-legged hawk (*Buteo lagopus*), rock ptarmigan (*Lagopus muta*), gyrfalcon (*Falco rusticolus*), and snowy owl (*Bubo scandiacus*). Black bear (*Ursus americanus*), short-tailed weasel (*Mustela erminea*) and long-tailed weasel (*Mustela frenata*) are generalist species known to occur in the area.

Lynx (*Lynx canadensis*), snowshoe hare (*Lagopus americanus*), mink (*Neovison vison*), heather vole (*Phenacomys ungava*), masked shrew (*Sorex cinerus*), porcupine (*Erethizon dorsatum*), and red squirrel (*Tamiasciurus hudsonicus*) are found in forested and shrub habitats. Forested habitats have a variety of bird species such as merlin (*Falcon columbarius*), northern flicker (*Colaptes auratus*), blackpoll warbler

(*Setophaga striata*), American three-toed woodpecker (*Picoides dorsalis*), pine grosbeak (*Piniola enucleator*), american robin (*Turdus migratorius*) and swainson's thrush (*Cathurus ustulatus*). Willow ptarmigan (*Lagopus lagopus*), American tree sparrow (*Spizelliodes arborea*), white-crowned sparrow (*Zonotrichia leucophrys*), and northern shrike (*Lanius borealis*) are found in shrub and thicket habitats.

The aquatic habitats at the Lower Sites may have waterfowl such as Canada goose (*Branta canadensis*) and red-breasted mergansers (*Mergus serrator*). Shorebirds are also known to be present, albeit at lower densities, including least sandpiper (*Calidris minutilla*), solitary sandpiper (*Tringa solitaria*), and spotted sandpiper (*Actitis macularius*).

1.2.3.3 Species at Risk

Species at Risk include species that appear on Schedule 1 of the federal Species at Risk Act (SARA) which have legal protection afforded and associated mandatory recovery planning (Government of Canada 2002). Provincially, listed species are protected under the Newfoundland and Labrador Endangered Species Act (NLESA) (Government of Newfoundland and Labrador 2004). To identify species listed under Schedule 1 of SARA and NLESA, a search of the Species at Risk Public Registry and the Government of Newfoundland and Labrador's Fisheries and Land Resources (NLFLR) website was conducted for mammals, birds, plants, mosses, and lichens.

Species at risk with potential to occur in the vicinity of Border Beacon are listed in Table 1.3. There is a low likelihood of short-eared owl based on available habitats. Eskimo curlew, harlequin duck, ivory gull, peregrine falcon, polar bear, red knot, rusty blackbird, and wolverine are not likely to occur based on known occurrences and available habitats at the Site. None of the plant, moss, and lichen species currently listed under SARA or under the NLESA have been identified at the Site.

Table 1.3 Species at Risk

Common Name	Species Name	Likelihood of Presence	Provincial Designation	SARA Status
Caribou	*Rangifer tarandus*	The threatened sedentary woodland caribou herds are not expected to occur on site. Caribou are expected to occur here but are the non-listed migratory George River Herd. **Not likely/ Not assessed**	Threatened (status applies to sedentary woodland only)	Threatened, Schedule 1
Eskimo Curlew	*Numenius borealis*	Uses a migration route through the province to wintering grounds in South America, but generally found along coastal areas (Gill et al. 2008); **Not likely /Not assessed**	Endangered	Endangered, Schedule 1
Harlequin Duck	*Histrionicus histrionicus*	Breeds mostly in fast flowing rivers in Québec and Newfoundland and Labrador; wintering habitat consists of rocky coastline, subtidal ledges, and exposed headlands (Robertson and Goudie 1999); No breeding habitat present. **Not likely / Not assessed**	Vulnerable	Special Concern, Schedule 1

Table 1.3 Species at Risk

Common Name	Species Name	Likelihood of Presence	Provincial Designation	SARA Status
Ivory Gull	*Pagophila eburnea*	Winters on the coast of Newfoundland and Labrador, occasional sightings inland Labrador (Mallory et al. 2008). **Not likely / Not assessed**	Endangered	Endangered, Schedule 1
Peregrine Falcon	*Falco peregrinus anatum/tundrius*	Breeds along Labrador coast, and its range is on the edge of the Site location; it could be present during migration but low likelihood (White et al. 2002); **Not likely / Not assessed**	Vulnerable	Special Concern, Schedule 1
Polar Bear	*Ursus maritimus*	Mainly found along the coast and would not be expected far inland on site (COSEWIC 2008). **Not likely / Not assessed**	Vulnerable	Special Concern, Schedule 1
Red Knot	*Calidris canutus rufa*	During their fall migration, they use coastal mudflats, salt marshes, sandy estuaries, and sand flats within Newfoundland and Labrador (NLFLR, 2018); Migratory habitat not present at site. **Not likely / Not assessed**	Endangered	Endangered, Schedule 1
Rusty Blackbird	*Euphagus carolinus*	Breeding range overlaps the Site, and habitats include fens, alder-willow bogs, muskegs, beaver ponds, swampy shores along lakes and streams (Avery 2013). No available habitats on Site. **Not likely / Not assessed**	Vulnerable	Special Concern, Schedule 1
Short-eared Owl	*Asio flammeus*	Breeding range overlaps the Site, and habitats include open areas of heathlands, tundra, and agricultural areas (Wiggins et al. 2006). These preferred habitats are limited at both the Upper and Lower Sites. **Low likelihood / Not assessed**	Vulnerable	Special Concern, Schedule 1
Wolverine	*Gulo gulo*	The wolverine's eastern range includes most of Labrador, however, it has not been verified since 1950 despite more recent unconfirmed reported sightings (COSEWIC 2003). **Not expected / Not assessed**	Endangered	Endangered, Schedule 1

1.3 Previous Environmental Assessments

Several environmental assessment reports have been produced (mainly since 1996) relating to potential and actual contamination in the vicinity of the former military site. Previous site investigations have discussed the history of the site, including operations and infrastructure, documented land transfers, and confirmation of the presence of petroleum hydrocarbons and metals in soil and metals in surface water at

the former military site at concentrations that exceed current regulatory guidelines. PCBs were also identified in soil but at concentrations below current regulatory guidelines. Previous environmental reports completed for Border Beacon include the following:

- Government of Newfoundland and Labrador, 1981. PCB Spills and General Environmental Mismanagement at EX-USAF Bases in Labrador;
- Government of Newfoundland and Labrador, 1996. Environmental Inspection, Abandoned Military Sites in Labrador;
- Jacques Whitford, 1998. Phase I Environmental Site Assessment, Border Beacon, Labrador;
- Jacques Whitford, 2002. Site Investigation & Detailed Qualitative Risk Assessment, Border Beacon, Labrador;
- Dillon Consulting, 2010. Site Investigation Report, Former DND Fuel Cache Site;
- GHD Ltd., 2016. Phase I Environmental Site Assessment, Former US Military Mid Canada Line Radar Site 212, Border Beacon, NL; and,
- Stantec Consulting Ltd. (Stantec), 2018. Phase II Environmental Site Assessment, Former Military Site, Border Beacon, NL. Final Report. File Number 121414915.200.

Based on environmental issues identified at the former military site during previous investigations, the Site received Classification Category 1 under the CCME NCSCS (CCME, 2008 and updates) completed as part of the Phase II ESA submitted by Stantec in 2018. The Lower and Upper Sites were assessed separately for NCSCS classification during the current investigation (Section 13.0).

1.4 Project Objectives

The project objectives as stated in the Request for Proposal (RFP) for the former military site in Border Beacon, NL, issued by NLDMAE on April 18, 2018, include collecting sufficient data to bring the Site through Steps 5, 6, and 7 of the 10-Step FACS, a remedial cost estimate, and the preparation of tender documents. The removal and disposal of waste fuel and oil was also an objective of the project.

1.5 Scope of Work

Stantec's specific scope of work for achieving the project objectives, as per the RFP prepared by NLDMAE for the former military site in Border Beacon, NL, was as follows:

- Target and investigate the boundaries of identified contaminants;
- Define site conditions required to identify contaminant pathways, particularly with respect to risk assessment;
- Provide contaminant and other information necessary to finalize remediation guidelines or risk assessment;
- Confirm or reclassify NCSCS scoring;
- Estimate / refine volumes and areas of impacted media;
- Finalize the conceptual site model;
- Provide all other information required to develop a Remedial Action Plan (RAP) and input to specifications and tender documents;
- Conduct applicable Risk Assessment Work; and
- Remove and dispose of waste fuel and oil from tanks, drums, and containers.

1.6 Regulatory Framework

The NLDMAE outlined soil and groundwater remediation criteria for petroleum hydrocarbons and other COPCs on February 22, 2005 under policy directive *PPD05-01*. These criteria are outlined in the *Guidance Document for the Management of Impacted Sites, Version 2.0* (January 2014). The purpose of this guidance document is to provide a clear process for the management of impacted sites in Newfoundland and Labrador that result in the satisfactory resolution of environmental contamination, which may present an unacceptable risk to human health and ecological receptors. The guidance document incorporates recent scientific and regulatory advances in this area that have resulted from work at the international, national, and regional levels.

1.6.1 Petroleum Hydrocarbons

For petroleum hydrocarbons, the NLDMAE guidance recommends the current version of the Atlantic RBCA (Risk-Based Corrective Action) guidance. The current version of the Atlantic RBCA guidance (Version 3 User Guidance Document, July 2012, revised 2015) is used as part of the current assessment.

Human Health Screening

The Atlantic RBCA guidance contains risk-based screening levels (RBSLs) for evaluating human exposure to sites impacted with TPH and BTEX. These guidelines are contained in “Tier I RBSL Tables” that are based on default conditions for typical sites and exposure pathways and are classified by receptor characteristics, groundwater usage, and soil type. In addition, the TPH guidelines are dependent on the nature of the hydrocarbon type (i.e., the guidelines vary for gasoline, fuel oil, and lube oil).

If site concentrations exceed the Tier I RBSLs, the site may be remediated to the Tier I RBSLs or a Tier II human health risk assessment may be completed to determine more appropriate clean-up levels. A Tier II human health risk assessment may include comparison of the site concentrations to the Tier II Pathway-Specific Screening Level (PSSL) tables or development of Site-Specific Target Levels (SSTLs) using the Atlantic RBCA Toolkit Version 3.2. PSSLs are only appropriate for sites where the exposure pathways assumed in the Tier I RBSL tables are not complete (*e.g.*, if a property has no building on site, there would be no potential for on-site indoor air exposure).

Users of the Tier I RBSLs or Tier II PSSLs are required to confirm that site conditions are compatible with the default site conditions used to generate the screening guidelines. If significant differences exist, the site should be evaluated using a site-specific risk assessment approach. As documented in the Site Assessment and Tier I/II Checklist presented in Appendix B, and as requested by NLDMAE, the human health Tier I RBSLs for a commercial site with non-potable groundwater and coarse-grained soil are applicable for the Site.

Ecological Screening

The current version of the *Atlantic RBCA user guidance document* (Version 3.0, July 2012, revised January 2015) includes an Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada. While the RBSLs, the PSSLs, and the Atlantic RBCA Toolkit assess risks to human health, the goal of the

Ecological Screening Protocol is to assess potential risks to the environment (specifically ecological receptors). While this protocol is not an ecological risk assessment, the protocol provides a decision-making framework that will result in one of the following three conclusions:

- The site does not pose a risk to ecological receptors/habitat and no further action is necessary related to the environment;
- The site should be remediated to Tier I ecological screening levels; or,
- The site should undergo further assessment in terms of quantifying ecological risks at the site (e.g., further delineation, quantitative ecological risk assessment).

The three parts of the ecological screening protocol are:

- Part I: Identification of petroleum hydrocarbon hazards in site media or site-influenced media;
- Part II: Identification of habitat and ecological receptors on or near a site; and,
- Part III: Identification of exposure pathways by which ecological receptors could come into contact with site petroleum hydrocarbons.

In accordance with the Atlantic RBCA requirements, the Ecological Screening Protocol has been completed and is included in Appendix B. A discussion of ecological screening levels (ESLs) is summarized in Table 1.4. Based on this evaluation, the ESLs for the Protection of Plants and Soil Invertebrates; Direct Soil Contact, the Protection of Wildlife (mammals and birds) and Livestock; Soil and Food Ingestion, Plant and Invertebrate Direct Contact with Shallow Groundwater, the Protection of Freshwater and Marine Aquatic Life from groundwater and surface water impacts, and the Protection of Freshwater and Marine Aquatic Life from sediment impacts are applicable for this Site.

Table 1.4 Ecological Screening Level Applicability within 200 m of the Site

Pathway	Are ESLs Applicable?	Rationale
Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a)*	Yes	The Upper Site and Lower Site are both surrounded by tundra, forest, and plains. Site hydrocarbons in surface soil may come into contact with terrestrial plants and invertebrates in these areas.
Protection of Wildlife (mammals and birds) and Livestock; Soil and Food Ingestion (Table 1b)*	Yes	The Upper Site and Lower Site are both surrounded by tundra, forest, and plains. Wildlife may come into contact with site hydrocarbons in surface soil.
Plant and Invertebrate Direct Contact with Shallow Groundwater (Table 2)*	Yes	Groundwater was encountered as shallow as 1.0 mbgs and would be expected to be near surface near shorelines in the vicinity of Ashuapun Lake.
Protection of Freshwater and Marine Aquatic Life from groundwater and surface water impacts (Table 3a and Table 3b)*	Yes	The waters of Ashuapun Lake surround the airstrip at the Lower Site and several ponds are located in the Waste Disposal Site.
Protection of Freshwater and Marine Aquatic Life from sediment impacts (Table 4)*	Yes	Freshwater sediments were encountered on the shores of Ashuapun Lake and the ponds in the Waste Disposal Site.

Note:
*Table references based on *Atlantic RBCA Version 3 User Guidance (Appendix 2).*

1.6.2 Other Contaminants

In addition to petroleum hydrocarbons, environmental media at the Site were analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), metals, PCBs, and general chemistry. In the absence of provincial guidelines, the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME Guidelines; 1999 and subsequent updates) and its associated documents are considered applicable. The CCME guidelines provide limits for contaminants in environmental media and are intended to maintain, improve, and/or protect environmental quality, and human and ecological health at contaminated sites in general. These criteria include numerical values for the assessment and remediation of soil and water in the context of agricultural, residential/parkland, commercial, and industrial land uses. In addition to land use, the CCME include numerical values depending on soil texture (i.e., coarse or fine-grained soils). Environmental soil and water quality guidelines are derived using toxicological data to determine the threshold level to key receptors. These criteria include the CCME Canadian Soil Quality Guidelines (SQGs), 1999, and Water Quality Guidelines (WQGs), 1999. The latest update of the CCME SQGs and WQGs can be obtained on-line at http://ceqg-rcqe.ccme.ca/. The NLDMAE Guidance Document indicates that in most instances, the CCME Environmental Quality Guidelines (CEQG) provide the basis for Tier I assessment.

Where there are no CCME guidelines available, guidelines from other Canadian Jurisdictions were applied using a hierarchical approach. If there was no guideline for a given COPC, the next jurisdiction in the hierarchy was referenced until an appropriate guideline was available.

The following hierarchy was used for establishing screening levels for contaminants (other than petroleum hydrocarbons) in soil, groundwater, sediment, and surface water:

1. CCME Canadian Environmental Quality Guidelines (CEQGs) for soil, surface water, and sediment (1999, and subsequent updates);
2. Alberta Environment Tier I Soil and Groundwater Remediation Guidelines (AENV, 2016);
3. Ontario Ministry of the Environment (MOE) Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (OMOE, 2011); and,
4. British Columbia (BC) Ministry of the Environment Contaminated Sites Regulation (BC, 1996, updated 2014) – Generic Numerical Standards for soil, surface water, sediment and vapour.

As per the NLDMAE RFP, the CCME CEQGs were given top priority. AENV guidelines use a target cancer risk of 1E-05 (1 in 100,000) for human health and follow the CCME (2006), which is similar to the Atlantic PIRI and Heath Canada (2010) methods. Ontario MOE and BC use a target cancer risk of 1E-06 (1 in 1,000,000) for human health. This, combined with the fact that the AENV guidelines are based on published screening levels derived for a full range of pathways for both human and ecological receptors, and that they regularly use Canadian Toxicity Reference Values and Canadian derivation methods is the reason AENV guidelines were given second priority for “Other Contaminants”. AENV guidelines were used only when criteria were not available from Atlantic RBCA guidance or CCME CEQGs. The Ontario guidelines were selected above the BC guidelines because they include a wider range of pathways.

For each jurisdiction, the most conservative values for a commercial non-potable site were used to screen COPCs. The differentiation between human health and ecologically-based guidelines was not made at the Tier I level for "Other Contaminants" (i.e., other than petroleum hydrocarbons).

The specific guidelines applied for each media were selected from the list of jurisdictions above (where available) and are listed below.

Soil

The following guidelines (in order of preference) were used for the screening of contaminants (other than petroleum hydrocarbons) in soil.

1. CCME Canadian Soil Quality Guidelines (1999, and subsequent updates) and Interim Remediation Criteria (1991) for non-potable, commercial land use for protection of human/ecological health. The CCME Interim Remediation Criteria are guideline values that have not yet been replaced by more scientifically defensible CSQGs. In the absence of CSQGs for the protection of human and/or ecological health, these values are to be applied for screening purposes.
2. Alberta Environment (AENV, 2016) Surface Soil Remediation Guidelines for Commercial land use (Table A-4, assuming non-potable groundwater).
3. Ontario Ministry of the Environment (MOE, 2011) Soil Standards for Use under Part XV.1 of the Environmental Protection Act for the protection of human health - Table 3: Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use.
4. British Columbia Ministry of the Environment (BC, 1996, updated 2014) Contaminated Sites Regulation Schedule 4: Generic Numerical Soil Standards: Commercial.

Surface Water

The following guidelines (in order of preference) were used for the screening of contaminants (other than petroleum hydrocarbons) in surface water.

1. CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (1999, and subsequent updates).
2. Alberta Environment (AENV, 2014) Environmental Quality Guidelines for Alberta Surface Waters.
3. British Columbia Ministry of the Environment (BC, 1996, updated 2014) Contaminated Sites Regulation Schedule 6: Generic Numerical Water Standards - Aquatic Life.

Sediment

The following guidelines (in order of preference) were used for the screening of contaminants (other than petroleum hydrocarbons) in sediment.

1. CCME Canadian Sediment Quality Guidelines for the Protection of Freshwater and Marine Aquatic Life (1999, and subsequent updates), Probable Effects Levels (PELs).
2. Alberta Environment (AENV, 2014) Environmental Quality Guidelines for Alberta Surface Waters, Probable Effects Levels (PELs).
3. Ontario Provincial Sediment Quality Guidelines (2008) Lowest Effects Level (LEL).

Groundwater

The following guidelines (in order of preference) were used for the screening of contaminants (other than petroleum hydrocarbons) in groundwater.

1. Alberta Environment (AENV, 2016) Groundwater Remediation Guidelines for Commercial land use (Table B-4, assuming non-potable groundwater).
2. Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

2.0 METHODOLOGY

The Phase III ESA involved the drilling of boreholes with some completed as monitor wells, associated soil and groundwater sampling and analysis, as well as collection of surface soil, freshwater sediment, and surface water. The field component of the Phase II ESA was completed between July 8, 2018 and July 21, 2018. Equipment and personnel were mobilized to the Lower Site with a Twin Otter operated by Provincial Airlines. Helicopter services for access to the Upper Site were provided by Canadian Helicopter Services. A detailed description of work completed for each area is provided in Sections 4 to 10. Field work was conducted by Stantec field technicians in accordance with Stantec's Standard Operating Procedures.

For the purposes of the Phase III ESA, the Site was divided into seven (7) areas, as follows:

1. Lower Site – General Area
2. Camp / Antenna Areas and AES Compound
3. Unknown Foundation / Building
4. Waste Disposal Sites
5. Former Innu Camp
6. General Dump Site
7. Upper Site

The areas previously identified as the Drums / Debris Area – South of Airstrip and the Unidentified Dump in the Phase II ESA (Stantec, 2018) are now labelled as the Former Innu Camp and the General Dump Site respectively.

The results of the investigation completed in each area are discussed in Sections 4 to 10. Approximate sample locations and analytical requirements for each area were established prior to the field program in a detailed sampling plan based on the findings of the Phase II ESA (Stantec, 2018). Actual sample locations were established in the field by Stantec. Drawings showing the layout of each individual area and actual sampling locations are provided in Appendix A (Drawings No. 121414998-EE-02 to 121414998-EE-11). Photographs of each area are shown in Appendix C.

2.1 Borehole and Monitor Well Sampling Program

Boreholes were drilled using a modified Geoprobe 540 MT drill rig supplied and operated by Cartwright Drilling Inc. of Happy Valley-Goose Bay, NL, under the supervision of Stantec personnel. Overburden material at the Site was drilled and sampled using a direct push drill with rod (50 mm diameter) and dual tube sampler (38 mm diameter). Bedrock was not encountered in boreholes drilled during the current assessment. Subsurface conditions encountered in the boreholes were logged by field personnel at the time of drilling. Coordinates of the borehole and monitor well locations are provided in Appendix D. The details of subsurface conditions encountered during drilling are presented in the Borehole and Monitor Well Records in Appendix E. The locations of the boreholes were established in the field by field personnel based on measurements from existing aboveground site infrastructure and previously identified areas of impacts based on the results of the Phase II ESA (Stantec, 2018).

Soil samples were collected and sampled from the boreholes using the dual tube sampler with single-use liners with integrated core catcher at regular intervals (i.e., 0.9 m). The soil samples collected were examined for field evidence of petroleum hydrocarbon impacts at the time of collection and where possible, duplicate soil samples were collected. The samples were placed in clean glass jars and vials with methanol preservative, where applicable. Aluminum foil was placed under the lids of duplicate samples. Head space soil vapour concentrations were measured in the duplicate sample jars using a MiniRAE 3000 Photoionization Detector (PID). Based on the measured soil vapor concentrations, field observations, and site usage and history, select soil samples were placed on ice in sample coolers and submitted to an accredited commercial laboratory for required laboratory analysis, according to the sampling plan.

Following drilling, monitor wells were installed in select boreholes. Monitor well locations were selected based on areal coverage and on proximity to suspected groundwater contamination. The monitor wells consisted of 50 mm diameter, flush-threaded, Schedule 40 PVC casing and No. 10 slot screen. Silica sand was placed around the screened section to inhibit silt intrusion into the well and facilitate well development. A bentonite seal was placed above the sand pack in each well near the surface, followed by additional sand pack to the surface. Due to limitations in Geoprobe push drilling in wet sandy conditions, a number of boreholes intended for monitor well installation collapsed and no monitor well was installed. Monitor wells and boreholes were pre-planned and labelled based on the sampling plan. In cases were a monitor well could not be installed (i.e., well collapse or refusal above groundwater table), the monitor well label was kept. These cases include the following: 2018-MW02, 2018-MW05, 2018-MW06, 2018-MW08, 2018-MW21, 2018-MW38, 2018-MW40, 2018-MW42, 2018-MW48, 2018-MW49, 2018-MW51, and 2018-MW52.

Depth to groundwater and free product observations were recorded in each well using a Solinst product interface probe. Each monitor well was then developed by pumping the equivalent of four to five times the well volume from the well with 13 mm Waterra tubing and a foot valve. Following monitor well development, groundwater samples were collected in clean, new sample bottles and submitted for required laboratory analysis. Groundwater samples for metals analysis were filtered in the field using a 0.45 µm syringe filter where possible. Where persistence of suspended solids prevented proper field filtration, laboratory filtration was requested prior to analysis. The samples were placed on ice in sample coolers and submitted to an accredited commercial laboratory for required laboratory analysis, according to the sampling plan.

In addition to the boreholes, two (2) auger probe holes were drilled with auger flights attached to a hammer drill. The auger probe was intended for shallow boreholes to increase coverage of the sub-surface investigation at the Lower Site but was ineffective at reaching sufficient depth (i.e., groundwater).

2.2 Surface Soil Sampling

Near surface (i.e., 0 - 0.2 m depth) bulk soil samples were collected in suspected impacted areas at the Site (denoted “SS”). The near surface soil samples were collected manually using clean sampling equipment. The soil samples collected were examined for field evidence of petroleum hydrocarbon impacts at the time of collection and where possible, duplicate soil samples were collected. The samples were placed in clean glass jars and vials with methanol preservative, where applicable. Aluminum foil was placed under the lids of duplicate samples. Head space soil vapour concentrations were measured in the duplicate sample jars using a PID. Based on the measured soil vapor concentrations, field observations, and site

usage and history, select soil samples were placed on ice in sample coolers and submitted to an accredited commercial laboratory for required laboratory analysis, according to the sampling plan.

2.3 Sediment and Surface Water Sampling

A freshwater sediment and surface water sampling program was carried out as part of the Phase III ESA. This included the collection of freshwater sediment and surface water samples from the shoreline of Ashuapun Lake and smaller ponds throughout the Site.

Freshwater sediment samples were collected using bulk sampling methods beneath approximately 0.3 m of water. Samples were collected from the sediment/water interface to 0.15 m below the bottom of the water column. The samples were examined for evidence of impacts and placed in clean glass jars. The samples were placed on ice in sample coolers prior to sample selection and submission to the laboratory. Sediment samples were submitted to an accredited commercial laboratory for analysis of the required COPCs, according to the sampling plan.

Surface water samples were collected into clean, new sample bottles with a sodium bisulphate or nitric acid preservative, where applicable. The samples were placed on ice in sample coolers prior to sample selection and submission to the laboratory. Surface water samples were submitted to an accredited commercial laboratory for analysis of the required COPCs, according to the sampling plan.

2.4 Vegetation Sampling

A vegetation sampling program was carried out as part of the Phase III ESA. This included the collection of vegetation samples (stems, leaves, and berries) from areas of concern.

Approximately 200 grams of sample were collected at each location. During collection, samples were placed into pre-cleaned laboratory-supplied plastic bags. The collected samples were stored and transported on ice in sample coolers prior to submission to the laboratory. Vegetation samples were submitted to an accredited commercial laboratory for required analysis, according to the sampling plan.

2.5 Laboratory Analysis

Laboratory analysis was completed by Maxxam Analytics at their laboratories in St. John's, NL, Bedford, NS, and Mississauga, Ontario (ON). Tables 4.1 to 10.1 herein provide a summary of laboratory work completed at the various areas of the Site as part of the Phase III ESA. Results of laboratory analysis are shown in Tables F.1 to F.27 in Appendix F. Methodologies utilized by Maxxam Analytics in analysis of the samples are noted on laboratory reports in Appendix G. Chain of custody documents for submitted samples are also provided in Appendix G.

2.5.1 Duplicate Samples

Field duplicate sampling was completed for approximately 10% of the total number of samples being analyzed. Replicate (laboratory duplicate) sampling is a standard QA/QC procedure that was also carried out by the analytical laboratories for 10% of the total number of samples analyzed. The laboratory duplicates

are denoted by the extension “Lab-Dup” and are listed in Table 2.1. The field duplicates were submitted blindly using the IDs presented in Table 2.2.

Table 2.1 Summary of Laboratory Duplicate Samples

Sample Matrix	Duplicate Sample	Laboratory Analysis Completed
Soil	2018-SS09 Lab-Dup	Metals
	2018-SS12 Lab-Dup	TPH/BTEX
	2018-SS26 Lab-Dup	TPH/BTEX
	2018-SS28 Lab-Dup	TPH/BTEX
	2018-SS35 Lab-Dup	TPH/BTEX
	2018-SS40 Lab-Dup	TPH/BTEX
	2018-SS64 Lab-Dup	TPH/BTEX
	2018- MW01-GP01 Lab-Dup	Metals
	2018- MW01-GP01 Lab-Dup 2	Metals
	2018-BH04-GP05 Lab-Dup	TPH/BTEX
	2018-MW05-GP02 Lab-Dup	TPH/BTEX
	2018-BH07-GP01 Lab-Dup	PAH
	2018-BH07-GP05 Lab-Dup	TPH/BTEX
	2018-BH12-GP08 Lab-Dup	TPH/BTEX
	2018-BH25-GP07 Lab-Dup	TPH/BTEX
	2018-MW27-GP08 Lab-Dup	TPH/BTEX
	2018-MW32-GP09 Lab-Dup	TPH Frac.
	2018-BH35-GP06 Lab-Dup	TPH/BTEX
	2018-BH36-GP02 Lab-Dup	Metals
	2018-MW38-GP02 Lab-Dup	Metals
	2018-MW53-GP01 Lab-Dup	Metals
Freshwater Sediment	2018-SED01 Lab-Dup	PAHs
	2018-SED05 Lab-Dup	Metals
	2018-SED07 Lab-Dup	PAHs
Surface Water	2018-SW01 Lab-Dup	VOCs
	2018-SW03 Lab-Dup	TPH/BTEX
	2018-SW06 Lab-Dup	TPH/BTEX
Vegetation	2018-VEG08 Lab-Dup	Metals
Groundwater	2018-MW01 Lab-Dup	TPH/BTEX, General Chemistry
	2018-MW41 Lab-Dup	General Chemistry
	2018-MW46 Lab-Dup	PCBs
	2018-MW50 Lab-Dup	General Chemistry

Table 2.2 Summary of Field Duplicate Samples Collected

Sample Matrix	Sample ID	Duplicate Sample	Laboratory Analysis Completed
Soil	2018-SS09	2018-SS60	TPH/BTEX, Metals
	2018-SS13	2018-SS61	TPH/BTEX, PAHs
	2018-SS14	2018-SS62	Metals, PCBs
	2018-SS19	2018-SS63	TPH/BTEX, PAHs
	2018-SS20	2018-SS64	TPH/BTEX, Metals, PAHs
	2018-SS21	2018-SS65	TPH/BTEX, Metals, PAHs
	2018-SS22	2018-SS66	TPH/BTEX, Metals, PAHs
	2018-SS28	2018-SS67	TPH/BTEX, Metals, PCBs
	2018-MW09-GP01	2018-MW66-GP01	PCBs
	2018-MW11-GP01	2018-MW62-GP01	TPH/BTEX
	2018-BH12-GP02	2018-BH64-GP02	Metals
	2018-BH13-GP08	2018-BH63-GP08	TPH/BTEX
	2018-MW14-GP03	2018-MW60-GP03	TPH/BTEX
	2018-BH25-GP07	2018-BH67-GP07	TPH/BTEX
Freshwater Sediment	2018-SED08	2018-SED10	TPH/BTEX, Metals, PCBs
Surface Water	2018-SW08	2018-SW10	TPH/BTEX, RCAP-MS
Groundwater	2018-MW47	2018-MW68	TPH/BTEX, RCAP-MS, PAHs, PCBs

Analytical results for duplicate samples are provided in analytical summary tables in Appendix F. Duplicate samples were collected at the same location as the Sample IDs listed above, therefore duplicate samples are not shown on Drawings No. 121414998-EE-03 to 121414998-EE-11. The field and laboratory duplicate sample results are not discussed in the Results sections herein (Sections 4.3 to 10.3), unless the parameters were classified differently (e.g., either above or below applicable guideline levels) in the duplicate samples.

2.5.2 Quality Assurance/Quality Control Sampling Program

Results of the QA/QC for laboratory and field duplicates for PHCs and metals for soil and sediment, and general chemistry for groundwater are presented in Table 2.3 and Table 2.4. Laboratory duplicates are used to assess the precision of the laboratory. The field duplicate samples were used to assess the precision of the sampling and analytical procedures. Typically, the relative percent difference (RPD) is calculated for the concentrations in the original sample and its duplicate. The RPD was calculated using the following formula:

$$RPD = \left| \frac{C_1 - C_2}{(C_1 + C_2)/2} \right| \times 100$$

Where: C1 is the concentration in the original sample;

C2 is the concentration in the sample duplicate.

If the results for either or both the original sample and the duplicate were less than the laboratory reportable detection limit (RDL), the RPD was not calculated. RPDs were only calculated if both analytical results were greater than five times the RDL. For laboratory duplicate samples, CCME (2016) recommends an RPD limit of up to 30% for soil and sediment, and 20% for groundwater. For field duplicate samples, CCME (2016) recommends an RPD limit of up to 60% for soil and sediment, and 40% for groundwater. Higher RPDs may be expected due to the natural heterogeneity of soil type (e.g., grain size) and contaminant distribution. A high RPD can also be expected when analyte concentrations are close to the analytical detection limit.

Table 2.3 Relative Percent Differences in Laboratory Duplicate Samples

Analysis	Matrix (acceptable RPD)	Range of %RPD	Number of analytes within acceptable RPD	Acceptable Duplicate Correlation?
Petroleum Hydrocarbons	Soil (30%)	0 to 80	8 of 12	Yes
Metals	Soil (30%)	0 to 40	37 of 39	Yes
General Chemistry	Groundwater (20%)	2 to 2	1 of 1	Yes
Metals	Sediment (30%)	1 to 10	5 of 5	Yes

Table 2.4 Relative Percent Differences in Field Duplicate Samples

Analysis	Matrix (acceptable RPD)	Range of %RPD	Number of analytes within acceptable RPD	Acceptable Duplicate Correlation?
Petroleum Hydrocarbons	Soil (60%)	5 to 129	10 of 13	Yes
Metals	Soil (60%)	0 to 134	49 of 50	Yes
PCBs	Soil (60%)	5 to 5	1 of 1	Yes
General Chemistry	Groundwater (40%)	8 to 86	4 of 5	Yes
Metals	Groundwater (40%)	0 to 58	4 of 5	Yes
Metals	Sediment (60%)	4 to 19	5 of 5	Yes
General Chemistry	Surface Water (40%)	0 to 9	5 of 5	Yes

In general, the duplicate results agree closely with their corresponding samples and confirm the representativeness of the sampling procedures. All individual parameters in the duplicates were classified the same (either above or below guidelines). The overall data quality is considered acceptable.

2.6 Fuel and Waste Oil Drum Disposal

Between July 9 and July 14, 2018, Stantec removed and processed/treated waste fuel and oil from tanks, drums, and containers throughout the Site. When required, drum contents were accessed with a drum bung wrench. Fuel/oil was removed from drums with a hand-cranked fuel pump and fuel/oil was transported in storage drums to a cyclonic barrel burner mobilized to the Site for incineration of the above-referenced liquid waste.

Oily water was also encountered in opened tanks and drums at the Site. A basic oil water separator was constructed at the Site with granular activated carbon filtration to process oily water and/or dissolved phase liquid petroleum hydrocarbons. Separated oil was transported to the incinerator. Empty drums, tanks, and containers were transported to the Drum Disposal Site (Site #1 at the Waste Disposal Sites) for future processing. Approximately 150 empty drums were added to the Drum Disposal Site during the current investigation. There are currently upward of 1,150 drums at the Drum Disposal Site.

A total of approximately 5,000 L of product was recovered and incinerated and an additional 3,400 L of oily water was processed with the oil water separator.

3.0 LOWER SITE – GENERAL AREA

3.1 Site Description

The Lower Site – General Area consists of site locations at the Lower Site that are not included in Camp / Antenna Areas and AES Compound, Unknown Foundation / Building, Waste Disposal Sites, Former Innu Camp, or General Dump Site. The main feature of the Lower Site – General Area is the 1,220-meter gravel airstrip running east to west that has provided access to the Lower Site since it's construction in the 1950s. Site surfaces consist mainly of sand and gravel with lichen, and sparse low-lying shrub cover. The site layout is shown in Drawing No. 121414998-EE-03 in Appendix A.

3.2 Description of Site Work

Field work at the Lower Site – General Area consisted of the drilling of two boreholes (one completed with a groundwater monitor well), the collection of one (1) sediment sample with corresponding surface water sample, one (1) groundwater sample, one (1) vegetation sample, and the emptying and removal of drum clusters identified during the Phase II ESA. The sample locations and general site features are shown on Drawing No. 121414998-EE-03 in Appendix A.

The laboratory analysis schedule completed for the Lower Site – General Area is presented in Table 3.1.

Table 3.1 Summary of Laboratory Work – Lower Site – General Area

Sample Locations	Sample Matrix		
	Soil/Sediment	**Water**	**Vegetation**
Soil: 2018-MW47-GP01, 2018-MW47-GP02, 2018-MW47-GP06, 2018-MW48-GP01, 2018-MW48-GP02, 2018-MW48-GP06 *Groundwater:* 2018-MW47 *Sediment:* 2018-SED06 *Surface Water:* 2018-SW06 *Vegetation:* 2018-VEG08	Soil TPH/BTEX (4), PAHs (2), Metals (3), PCB (1) Sediment Metals (1)	Groundwater TPH/BTEX (1), General Chemistry (1), PAH (1), Metals (1), PCBs (1) Surface Water TPH/BTEX (1), General Chemistry (1), Metals (1)	Vegetation Metals (1), PCBs (1)

3.3 Results

3.3.1 Sub-surface Conditions

Conditions encountered in the boreholes and monitor wells are described in detail on the Borehole and Monitor Well Records in Appendix E and are summarized below.

3.3.1.1 Stratigraphy

The stratigraphy in the boreholes generally consisted of a well-graded, brown sand with gravel material. Refusal on probable frozen ground occurred at 4.9 mbgs in borehole 2018-MW48. Bedrock was not encountered in the boreholes.

3.3.1.2 Groundwater Observations

The groundwater level was measured in monitor well 2018-MW47 at 4.094 mbgs on July 19, 2018. Groundwater levels at the Site are expected to vary seasonally and in response to individual precipitation/melting events. The measured groundwater elevation at the Lower Site – General Area is shown in Table 3.2.

Table 3.2 Groundwater Elevations – Lower Site – General Area

Monitor Well	Ground Elevation (m)	July 2018	
		Groundwater Depth (mbgs)	Groundwater Elevation (m)
2018-MW47	450.397	4.094	446.302

Groundwater was not encountered in borehole 2018-MW-48. Based on the measured groundwater elevations throughout the Lower Site, the direction of shallow groundwater flow in the Lower Site – General area is variable based on location but is generally to the north. The groundwater flow direction is shown on Drawing No. 121414998-EE-03 in Appendix A. The depths to groundwater recorded in the boreholes and monitor wells are presented on the Borehole and Monitor Well Records in Appendix E.

3.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining or free liquid phase petroleum hydrocarbons were not observed on soil or in groundwater at the Lower Site – General Area.

Hydrocarbon odours were not detected in soils sampled as part of the current investigation.

Liquid petroleum hydrocarbons identified in several drums along the length of the airstrip were removed and incinerated.

3.3.3 Soil Vapour Concentrations

Headspace soil vapour concentrations in duplicate soil sample jars for samples collected from boreholes were measured using a PID. Headspace soil vapour concentrations are not regulated; however, they are used as a screening tool to indicate the possible presence of volatile petroleum products (i.e., gasoline, and, to a lesser extent, diesel and fuel oil). Soil vapour concentrations vary with both fuel type and age and are not directly equivalent to soil analytical results.

Headspace soil vapour concentrations were not detected within the borehole soil samples. PID readings for each sample are included on the Borehole and Monitor Well Records in Appendix E.

3.3.4 Laboratory Analytical Results

Results of the laboratory analysis of soil, groundwater, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix F and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix G.

3.3.4.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on four (4) soil samples collected from the Lower Site – General Area as part of the current investigation (2018-MW47-GP01, 2018-MW47-GP06, 2018-MW48-GP01, and 2018-MW48-GP06). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

TPH and BTEX parameters were not detected above the laboratory reportable detection limits in the soil samples analyzed.

PAHs in Soil

PAH analysis was conducted on two (2) soil samples collected from the Lower Site – General Area as part of the current investigation (2018-MW47-GP02 and 2018-MW47-GP06). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

PAHs were not detected above the laboratory reportable detection limits in the soil samples analyzed.

Metals in Soil

Metals analysis was conducted on three (3) soil samples collected from the Lower Site – General Area as part of the current investigation (2018-MW47-GP01, 2018-MW48-GP02 and 2018-MW48-GP06). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were above the laboratory reportable detection limits in the three (3) samples. None of the detected concentrations of metals in soils exceeded the applicable guidelines for a commercial site, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on one (1) soil sample collected from the Lower Site – General Area as part of the current investigation (2018-MW48-GP01). Results of the laboratory analysis of the soil sample for PCBs are presented in Table F.7 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the soil sample analyzed.

3.3.4.2 Groundwater Analytical Results

Petroleum Hydrocarbons in Groundwater

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) groundwater sample collected from the Lower Site – General Area as part of the current investigation (2018-MW47). Results of the laboratory analysis of the groundwater sample for petroleum hydrocarbons are presented in Table F.11 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in groundwater sample analyzed.

General Chemistry in Groundwater

General chemistry analysis was conducted on one (1) groundwater sample collected from the Lower Site – General Area as part of the current investigation (2018-MW47). Results of the laboratory analysis of the groundwater sample for general chemistry are presented in Table F.12 in Appendix F.

The detected concentrations of general chemistry parameters in groundwater were within the applicable guidelines, where such guidelines exist.

PAHs in Groundwater

PAH analysis was conducted on one (1) groundwater sample collected from the Lower Site – General Area as part of the current investigation (2018-MW47). Results of the laboratory analysis of the groundwater sample for PAHs are presented in Table F.13 in Appendix F.

PAHs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

Dissolved Metals in Groundwater

Dissolved metals analysis was conducted on one (1) groundwater sample collected from the Lower Site – General Area as part of the current investigation (2018-MW47). Results of the laboratory analysis of the groundwater sample for metals are presented in Table F.14 in Appendix F.

Various dissolved metals were detected in the groundwater sample analyzed. None of the detected concentrations of dissolved metals exceeded the applicable guidelines, where such guidelines exist.

PCBs in Groundwater

PCB analysis was conducted on one (1) groundwater sample collected from the Lower Site – General Area as part of the current investigation (2018-MW47). Results of the laboratory analysis of the groundwater sample for PCBs are presented in Table F.15 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

3.3.4.3 Sediment Analytical Results

Metals in Sediment

Metals analysis was conducted on one (1) sediment sample collected from the Lower Site – General Area as part of the current investigation (2018-SED06). Results of the laboratory analysis of the sediment sample for metals are presented in Table F.18 in Appendix F.

Concentrations of various metals were detected in the sediment sample analyzed. None of the detected concentrations of metals in sediment exceeded the applicable guidelines, where such guidelines exist.

3.3.4.4 Surface Water Analytical Results

Petroleum Hydrocarbons in Surface Water

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) surface water sample collected from the Lower Site – General Area as part of the current investigation (2018-SW06). Results of the laboratory analysis of the surface water sample for petroleum hydrocarbons are presented in Table F.20 in Appendix F.

TPH and BTEX parameters were not above the laboratory reportable detection limits in the surface water sample analyzed.

General Chemistry in Surface Water

General chemistry analysis was conducted on one (1) surface water sample collected from the Lower Site – General Area as part of the current investigation (2018-SW06). Results of the laboratory analysis of the surface water sample for general chemistry are presented in Table F.21 in Appendix F.

The detected concentrations of general chemistry parameters in surface water were within the applicable guidelines, where such guidelines exist.

Total Metals in Surface Water

Total metals analysis was conducted on one (1) surface water sample collected from the Lower Site – General Area as part of the current investigation (2018-SW06). Results of the laboratory analysis of the surface water sample for metals are presented in Table F.24 in Appendix F.

None of the detected concentrations of metals in surface water exceeded the applicable CCME Water Quality Guidelines, where such guidelines exist.

3.3.4.5 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on one (1) vegetation sample collected from the Lower Site – General Area as part of the current investigation (2018-VEG08). Results of the laboratory analysis of the vegetation sample for metals are presented in Table F.26 in Appendix F.

Concentrations of various metals were detected in the vegetation sample analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on one (1) vegetation sample collected from the Lower Site – General Area as part of the current investigation (2018-VEG08). Results of the laboratory analysis of the vegetation sample for PCBs are presented in Table F.27 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation sample analyzed.

3.3.5 Summary of Exceedances

The Phase III ESA did not identify COPCs in environmental media at the Lower Site – General Area with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. An exceedance was recorded in surface water during the previous Phase II ESA and is summarized in Table 3.3.

Table 3.3 Surface Water Sample Exceedances – Lower Site – General Area

Year	Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1]
2017	BB-SW2 (2017)	Aluminum	110	100 (CCME WQG)
Referenced Guidelines: [1] CCME WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)				

The location of the metals exceedance at the Lower Site – General Area is shown on Drawing No. 121414998-EE-03 in Appendix A.

4.0 CAMP / ANTENNA AREAS AND AES COMPOUND

4.1 Site Description

The Camp / Antenna Areas and AES Compound is located near the northwest corner of the airstrip at the Lower Site. Site surfaces consist mainly of gravel with lichen, and low-lying shrub cover. Although details of the infrastructure at the Lower Site between 1958 to 1965 are unknown, based on an investigation of the Site in 1980, it is assumed this area consisted primarily of camp accommodations, a communication/weather station, a maintenance garage, and a re-fueling area. Areas of interest at this location include the camp fuel shed building, approximately 30 drums (some half-filled) along the south wall of the camp fuel shed building (drums now removed), 12 ASTs (4,500 L each), a camp garage building with a full 900 L AST (now removed), the former re-fueling area, a full 200 L drum adjacent to the re-fueling area (now removed), four (4) full drums (now removed) south of the former re-fueling area, a dyked 113,516 L tank, one (1) antenna, four (4) former antennae, two (2) former ASTs (4,546 L each), two (2) former camp accommodation buildings, a shed, a former above-ground septic tank, an atmospheric environment services (AES) storage building, and an AES equipment building. Locations of these features are shown in Drawing No. 121414998-EE-04 in Appendix A.

4.2 Description of Site Work

Field work at the Camp / Antenna Areas and AES Compound consisted of the drilling of 36 boreholes (with 12 completed as groundwater monitor wells), the collection of 19 surface soil samples, three (3) sediment samples with corresponding surface water samples, 12 groundwater samples, two (2) vegetation samples, and the emptying and removal of drums and tanks identified during the Phase II ESA. The sample locations and general site features are shown on Drawing No. 121414998-EE-04 in Appendix A.

The laboratory analysis schedule completed for the Camp / Antenna Areas and AES Compound is presented in Table 4.1.

Table 4.1 Summary of Laboratory Work – Camp / Antenna Areas and AES Compound

Sample Locations	Sample Matrix		
	Soil/ Sediment	**Water**	**Vegetation**
Soil: 2018-SS01, 2018-SS02, 2018-SS03, 2018-SS04, 2018-SS05, 2018-SS06, 2018-SS07, 2018-SS08, 2018-SS09, 2018-SS10, 2018-SS11, 2018-SS12, 2018-SS13, 2018-SS14, 2018-SS15, 2018-SS16, 2018-SS17, 2018-SS18, 2018-SS49, 2018-BH03-GP01, 2018-BH03-GP06, 2018-BH03-GP07, 2018-BH04-GP01, 2018-BH04-GP05, 2018-BH07-GP01, 2018-BH07-GP05, 2018-BH10-GP01, 2018-BH10-GP02, 2018-BH10-GP08, 2018-BH12-GP01, 2018-BH12-GP02, 2018-BH12-GP08, 2018-BH13-GP01, 2018-BH13-GP07, 2018-BH13-GP08, 2018-BH15-GP01, 2018-BH15-GP02, 2018-BH15-GP08, 2018-BH16-GP03, 2018-BH19-GP05, 2018-BH22-GP01, 2018-BH22-GP07, 2018-BH23-GP01, 2018-BH24-GP01, 2018-BH24-GP07, 2018-BH25-GP01, 2018-BH25-GP07, 2018-BH28-GP02, 2018-BH29-GP01, 2018-BH30-GP07, 2018-MW01-GP01, 2018-MW01-GP02, 2018-MW01-GP03, 2018-MW01-GP07, 2018-MW02-GP01, 2018-MW02-GP04, 2018-MW05-GP02, 2018-MW06-GP01, 2018-MW06-GP03, 2018-MW06-GP05, 2018-MW08-GP01, 2018-MW09-GP01, 2018-MW09-GP02, 2018-MW11-GP01, 2018-MW11-GP08, 2018-MW14-GP01, 2018-MW14-GP03, 2018-MW14-GP07, 2018-MW17-GP01, 2018-MW17-GP03, 2018-MW17-GP04, 2018-MW18-GP06, 2018-MW20-GP02, 2018-MW20-GP08, 2018-MW21-GP01, 2018-MW21-GP02, 2018-MW26-GP08, 2018-MW27-GP01, 2018-MW27-GP07, 2018-MW27-GP08, 2018-MW31-GP01, 2018-MW31-GP09, 2018-MW32-GP01, 2018-MW32-GP02, 2018-MW32-GP09, 2018-MW50-GP01, 2018-MW50-GP04, 2018-MW50-GP05, 2018-MW51-GP03, 2018-MW52-GP05, 2018-MW53-GP01, 2018-MW53-GP02 *Groundwater:* 2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32, 2018-MW50 *Sediment:* 2018-SED07 to 2018-SED09 *Surface Water:* 2018-SW07 to 2018-SW09 *Vegetation:* 2018-VEG01 and 2018-VEG02	Soil TPH/BTEX (71), TPH Frac. (2), Metals (18), PCB (7) Sediment TPH/BTEX (3), PAHs (2), Metals (3), PCB (1)	Groundwater TPH/BTEX (12), General Chemistry (12), PAH (12), Metals (12), PCBs (12) Surface Water TPH/BTEX (3), General Chemistry (3), Metals (3)	Vegetation Metals (2), PCBs (2)

4.3 Results

4.3.1 Sub-surface Conditions

Conditions encountered in the boreholes and monitor wells are described in detail on the Borehole and Monitor Well Records in Appendix E and are summarized below.

4.3.1.1 Stratigraphy

The stratigraphy in the boreholes generally consisted of a well-graded, brown sand with gravel material. Refusal on probable frozen ground, cobbles or an unknown obstacle occurred at 3.9 mbgs in borehole 2018-MW02, 4.5 mbgs in borehole 2018-MW05, 4.3 mbgs in borehole 2018-MW06, 5.3 mbgs in borehole 2018-MW08, 1.5 mbgs in borehole 2018-MW53, 4.7 mbgs in borehole 2018-BH04 and 2.6 mbgs in borehole 2018-BH16. Bedrock was not encountered in the boreholes.

4.3.1.2 Groundwater Observations

The groundwater levels measured in the monitor wells on July 18, 2018 ranged from 1.122 mbgs in 2018-MW53 to 7.546 mbgs in MW27. Groundwater levels at the Site are expected to vary seasonally and in response to individual precipitation/melting events. A summary of measured groundwater elevations at the Camp / Antenna Areas and AES Compound is shown in Table 4.2.

Table 4.2 Groundwater Elevations – Camp / Antenna Areas and AES Compound

Monitor Well	Ground Elevation (m)	July 2018	
		Groundwater Depth (mbgs)	Groundwater Elevation (m)
2018-MW01	450.171	5.297	444.874
2018-MW09	450.686	6.803	443.883
2018-MW11	450.400	6.553	443.847
2018-MW14	450.006	6.170	443.836
2018-MW17	448.816	2.561	446.255
2018-MW18	448.613	3.103	445.510
2018-MW20	449.930	6.050	443.880
2018-MW26	449.743	5.913	443.830
2018-MW27	450.375	7.546	442.829
2018-MW31	450.368	6.516	443.852
2018-MW32	450.908	7.060	443.848
2018-MW53	447.387	1.122	446.265

Groundwater was either not encountered, or groundwater depths were estimated based on sample moisture for the remaining boreholes. Based on the measured groundwater elevations throughout the Lower Site, the direction of shallow groundwater flow in the Camp / Antenna Areas and AES Compound area is to the north toward Ashuapun Lake. The groundwater flow direction is shown on Drawing No. 121414998-EE-03 in Appendix A. The depths to groundwater recorded in the boreholes and monitor wells are presented on the Borehole and Monitor Well Records in Appendix E.

4.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining was observed on surface soils in the vicinity of 2018-BH04, 2018-MW20, 2018-MW26, 2018-MW31, and 2018-MW32.

Petroleum hydrocarbon sheen was observed on groundwater in monitor wells 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32, and 2018-MW50.

Slight to strong petroleum hydrocarbon odours were detected on soil in surface samples 2018-SS03, 2018-SS13, 2018-SS14, 2018-SS15, 2018-SS17, boreholes 2018-MW02, 2018-BH04, 2018-MW06, 2018-BH07, 2018-BH10, 2018-BH12, 2018-BH13, 2018-BH15, 2018-BH16, 2018-BH19, 2018-MW21, 2018-BH22, 2018-BH23, 2018-BH24, 2018-BH25, 2018-BH28, 2018-BH29, 2018-BH30, and monitor wells 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32, and 2018-MW50.

Liquid petroleum hydrocarbons identified in approximately 50 drums and one (1) 900 L AST across the Camp / Antenna Areas and AES Compound were removed and incinerated.

4.3.3 Soil Vapour Concentrations

Headspace soil vapour concentrations were measured in duplicate soil sample jars for samples collected from the boreholes using a PID. Headspace soil vapour concentrations are not regulated; however, are used as a screening tool to indicate the possible presence of volatile petroleum products (i.e., gasoline, and, to a lesser extent, diesel and fuel oil). Soil vapour concentrations vary with both fuel type and age and are not directly equivalent to soil analytical results.

The headspace soil vapour concentrations measured in the borehole soil samples collected from the site ranged from non-detect in multiple samples to 660 ppm_v in sample 2018-MW20-GP08. PID readings for each soil sample are included on the Borehole and Monitor Well Records in Appendix E.

4.3.4 Laboratory Analytical Results

Results of the laboratory analysis of soil, groundwater, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix F and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix G.

4.3.4.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on 71 soil samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SS01 to 2018-SS18, 2018-BH03-GP01, 2018-BH03-GP07, 2018-BH04-GP01, 2018-BH04-GP05, 2018-BH07-GP05, 2018-BH10-GP01, 2018-BH10-GP08, 2018-BH12-GP01, 2018-BH12-GP08, 2018-BH13-GP01, 2018-BH13-GP08, 2018-BH15-GP02, 2018-BH15-GP08, 2018-BH16-GP03, 2018-BH19-GP05, 2018-BH22-GP01, 2018-BH22-GP07, 2018-BH23-GP01, 2018-BH24-GP01, 2018-BH24-GP07, 2018-BH25-GP01, 2018-BH25-GP07, 2018-BH28-GP02, 2018-BH29-GP01, 2018-BH30-GP07, 2018-MW01-GP02, 2018-MW01-GP07, 2018-MW02-GP04, 2018-MW05-GP02, 2018-MW06-GP03, 2018-MW06-GP05, 2018-MW08-GP01, 2018-MW09-GP02, 2018-MW11-GP01, 2018-MW11-GP08, 2018-MW14-GP03, 2018-MW14-GP07, 2018-MW17-GP04, 2018-MW18-GP06, 2018-MW20-GP02, 2018-MW20-GP08, 2018-MW21-GP02, 2018-MW26-GP08, 2018-MW27-GP01, 2018-MW27-GP08, 2018-MW31-GP01, 2018-MW31-GP09, 2018-MW32-GP02, 2018-MW32-GP09, 2018-MW50-GP05, 2018-MW51-GP03, 2018-MW52-GP05 and 2018-MW53-GP02). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

Petroleum hydrocarbon fractionation (TPH Fract./BTEX) was conducted on two (2) soil samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-MW32-GP09 and 2018-MW18-GP06). Results of the laboratory analysis of soil samples for petroleum hydrocarbon fractionation are presented in Table F.2 in Appendix F.

TPH was detected in 41 of the 71 soil samples analyzed at concentrations ranging from 17 mg/kg to 7,100 mg/kg. The laboratory analytical reports indicated that products impacting the samples generally resembled gasoline, fuel oil, weathered fuel oil, lube oil or a mixture of fuel oil or weathered fuel oil and lube oil. The concentrations of TPH in samples 2018-BH12-GP08 (5,800 mg/kg), 2018-BH15-GP08 (2,300 mg/kg), 2018-BH25-GP07 (1,400 mg/kg), 2018-BH28-GP02 (1,100 mg/kg), 2018-BH30-GP07 (2,300 mg/kg), 2018-MW06-GP03 (4,400 mg/kg), 2018-MW17-GP04 (1,800 mg/kg), 2018-MW20-GP08 (7,100 mg/kg), 2018-MW31-GP09 (1,800 mg/kg) and 2018-MW50-GP05 (7,000 mg/kg) exceeded the applicable Tier I RBSL for a commercial site with non-potable groundwater, coarse grained soil, and gasoline or fuel oil impacts of 870 mg/kg and 4,000 mg/kg, respectively. None of the remaining detected concentrations of TPH exceeded the applicable Tier I RBSLs. The chromatogram in four (4) samples collected from the Camp / Antenna Areas and AES Compound did not return to baseline. This can be indicative of the presence of heavier hydrocarbon fractions in the soil. However, based on historical site activities, anthropogenic presence of heavier hydrocarbon fractions is not expected at the site.

One or more BTEX parameters were detected in 16 soil samples, but none of the detected concentrations of BTEX parameters exceeded the applicable Tier I RBSLs.

Concentrations of hydrocarbon fraction F2 and/or F3 exceeded the applicable Tier I ESLs for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) (260 mg/kg and 1,700 mg/kg, respectively) in soil samples 2018-SS03 (F2 = 2,800 mg/kg), 2018-SS13 FLD-DUP (F2 = 700 mg/kg), 2018-SS14 (F2 = 2,500 mg/kg), 2018-SS17 (F2 = 550 mg/kg), 2018-BH04-GP01 (F2 = 3,000 mg/kg), 2018-BH28-GP02 (F2 = 900 mg/kg), 2018-MW11-GP01 (F2 = 420 mg/kg), 2018-MW21-GP02 (F2 = 620 mg/kg), 2018-MW27-GP01 (F2 = 720 mg/kg) and 2018-MW32-GP02 (F2 = 1,500 mg/kg).

PAHs in Soil

PAH analysis was conducted on 25 soil samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SS01, 2018-SS02, 2018-SS07, 2018-SS13, 2018-SS15, 2018-SS18, 2018-BH03-GP01, 2018-BH03-GP07, 2018-BH04-GP05, 2018-BH07-GP01, 2018-BH10-GP02, 2018-BH13-GP07, 2018-BH15-GP01, 2018-BH28-GP02, 2018-BH29-GP01, 2018-MW01-GP03, 2018-MW02-GP01, 2018-MW06-GP01, 2018-MW14-GP01, 2018-MW14-GP07, 2018-MW17-GP03, 2018-MW21-GP01, 2018-MW27-GP07, 2018-MW32-GP01, and 2018-MW50-GP04). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

One or more PAH parameters were detected in eight (8) of the 25 soil samples analyzed. As per the CCME PAH guidance document, potentially carcinogenic PAHs were assessed cumulatively by multiplying concentrations of potentially carcinogenic PAHs by benzo(a)pyrene (B[a]P) Potency Equivalence Factors (PEFs) and summing the products to produce a B[a]P total potency equivalent (TPE). The non-carcinogenic PAHs were assessed individually by comparing concentrations to applicable human health guidelines from other jurisdictions and to the applicable CCME SQGs for the protection of ecological health.

The concentrations of naphthalene in soil sample 2018-BH04-GP05 (0.38 mg/kg) exceeded the applicable CCME SQG for a commercial site for the protection of environmental health of 0.013 mg/kg. Concentrations of phenanthrene in soil samples 2018-BH28-GP02 (0.088 mg/kg) and 2018-MW17-GP03 (0.088 mg/kg) exceeded the applicable CCME SQG for a commercial site for the protection of environmental health of 0.046 mg/kg. Non-detected concentrations of acenaphthene in soil sample 2018-MW02-GP01 and naphthalene in soil samples 2018-MW02-GP01, 2018-MW32-GP01, and 2018-MW50-GP04 had RDLs exceeding the applicable CCME SQG due to matrix/co-extractive interference during laboratory analysis.

The detected concentrations of individual PAH parameters in the samples analyzed were below the applicable guidelines for the protection of human health from other jurisdictions, where such guidelines exist. The calculated B[a]P TPEs were below the applicable CCME SQG (all land uses).

Metals in Soil

Metals analysis was conducted on 18 soil samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SS06, 2018-SS09, 2018-SS10, 2018-SS11, 2018-SS14, 2018-SS18, 2018-BH03-GP02, 2018-BH10-GP01, 2018-BH12-GP02, 2018-BH24-GP01, 2018-MW01-GP01, 2018-MW06-GP01, 2018-MW08-GP01, 2018-MW09-GP02, 2018-MW11-GP08, 2018-

MW32-GP02, 2018-MW50-GP01, and 2018-MW53-GP01). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the 18 samples. The concentration of copper in soil sample 2018-SS11 (610 mg/kg) exceeded the CCME commercial SQG of 91 mg/kg. None of the remaining detected concentrations of metals in soil exceeded the applicable CCME SQGs for a commercial site, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on seven (7) soil samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SS03, 2018-SS07, 2018-SS14, 2018-MW09-GP01, 2018-MW14-GP01, 2018-MW17-GP01, and 2018-MW32-GP01). Results of the laboratory analysis of soil samples for PCBs are presented in Table F.7 in Appendix F.

PCBs were detected in three (3) of the seven (7) soil samples analyzed at concentrations ranging from 0.098 µg/g to 0.36 µg/g. None of the detected concentrations of PCBs in soil exceeded the applicable CCME SQG for a commercial site of 33 µg/g.

4.3.4.2 Groundwater Analytical Results

Petroleum Hydrocarbons in Groundwater

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on 12 groundwater samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). Results of the laboratory analysis of the groundwater samples for petroleum hydrocarbons are presented in Table F.11 in Appendix F.

TPH was detected in 11 groundwater samples analyzed at concentrations ranging from 0.14 mg/L to 180 mg/L. The laboratory analytical reports indicated that products impacting the samples had either unidentified compounds in the fuel oil range (2018-MW01 and 2018-MW11), resembled the fuel oil fraction (2018-MW14, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW32 and 2018-MW50), resembled the weathered fuel oil fraction (2018-MW17) or had a mixture of the fuel oil fraction and possible lube oil fraction (2018-MW31). The detected concentrations of TPH in samples 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50 exceeded the applicable Tier I RBSL for a commercial site with non-potable groundwater, coarse grained soil, and fuel oil/lube oil impacts of 20 mg/L.

One or more BTEX parameters were detected in samples 2018-MW14, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50. The detected concentrations of the BTEX parameters did not exceed the applicable Tier I RBSLs for a commercial site with non-potable groundwater and coarse grained soil.

Concentrations of hydrocarbon fraction F2 exceeded the applicable Tier I ESLs for the Protection of Plants and Soil Invertebrates (Table 2) (3.1 mg/L) in groundwater samples 2018-MW14 (8.5 mg/L), 2018-MW17 (59 mg/L), 2018-MW18 (20 mg/L), 2018-MW20 (38 mg/L), 2018-MW26 (88 mg/L), 2018-MW27 (170 mg/L), 2018-MW31 (58 mg/L), 2018-MW32 (64 mg/L) and 2018-MW50 (50 mg/L).

Concentrations of TPH (gasoline, fuel oil or lube oil) exceeded the applicable Tier I ESLs for the Freshwater and Marine Aquatic Life (Table 3a, RBCA 2015) (13 mg/L, 0.84 mg/L and 0.48 mg/L, respectively) in groundwater samples 2018-MW14 (10 mg/L), 2018-MW17 (65 mg/L), 2018-MW18 (24 mg/L), 2018-MW20 (44 mg/L), 2018-MW26 (100 mg/L), 2018-MW27 (180 mg/L), 2018-MW31 (68 mg/L), 2018-MW32 (71 mg/L) and 2018-MW50 (59 mg/L).

General Chemistry in Groundwater

General chemistry analysis was conducted on 12 groundwater sample collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). Results of the laboratory analysis of the groundwater samples for general chemistry are presented in Table F.12 in Appendix F.

pH measured in two (2) of the analyzed samples (2018-MW11 and 2018-MW50 at 2.75 and 6.03) fall outside the applicable guideline of 6.5 to 9.0. The measured pH value of 2.75 in sample 2018-MW11 is suspected to be the result of preservative cross-contamination during sample collection. The other detected concentrations of general chemistry parameters in the groundwater samples were within the applicable guidelines, where such guidelines exist.

PAHs in Groundwater

PAH analysis was conducted on 12 groundwater samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). Results of the laboratory analysis of groundwater samples for PAHs are presented in Table F.13 in Appendix F.

One or more PAH parameters were detected in 10 of the 12 groundwater samples analyzed (2018-MW09, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). The following exceedances were observed:

- The concentration of 1-methylnaphthalene in groundwater sample 2018-MW26 (1,600 µg/L) exceeded the OMOE guideline of 1,500 µg/L.
- The concentrations of 2-methylnaphthalene in groundwater samples 2018-MW26 (1,800 µg/L) and 2018-MW27 (1,700 µg/L) exceeded the OMOE guideline of 1,500 µg/L.
- The concentration of acenaphthene in groundwater sample 2018-MW26 (270 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 5.8 µg/L.
- The concentrations of anthracene in groundwater samples 2018-MW26 (2.2 µg/L) and 2018-MW32 (2.6 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 0.012 µg/L.

- The concentration of chrysene in groundwater sample 2018-MW26 (1.6 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 1.4 µg/L.
- The concentrations of fluoranthene in groundwater samples 2018-MW26 (2.8 µg/L), 2018-MW27 (0.19 µg/L) and 2018-MW31 (0.12 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 0.04 µg/L.
- The concentrations of fluorene in groundwater samples 2018-MW20 (3.7 µg/L), 2018-MW26 (190 µg/L), 2018-MW27 (57 µg/L), 2018-MW31 (3.5 µg/L), 2018-MW32 (5.0 µg/L) and 2018-MW50 (3.8 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 3 µg/L.
- The concentrations of naphthalene in groundwater samples 2018-MW14 (110 µg/L), 2018-MW18 (56 µg/L), 2018-MW20 (130 µg/L), 2018-MW26 (150 µg/L), 2018-MW27 (460 µg/L), 2018-MW31 (110 µg/L) and 2018-MW32 (210 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 1.1 µg/L.
- The concentrations of phenanthrene in groundwater samples 2018-MW26 (170 µg/L), 2018-MW27 (25 µg/L) and 2018-MW32 (2.3 µg/L) exceeded the Alberta Groundwater Remediation Guideline for a commercial, non-potable site of 0.4 µg/L.
- The concentrations of pyrene in groundwater samples 2018-MW17 (0.059 µg/L), 2018-MW26 (3.6 µg/L), 2018-MW27 (0.26 µg/L), 2018-MW31 (0.26 µg/L) and 2018-MW50 (0.17 µg/L) exceeded the Alberta Groundwater Remediation Guideline for an industrial, non-potable site of 0.025 µg/L.

None of the remaining detected concentrations of PAHs in groundwater exceeded the applicable guidelines.

Screening could not be completed for non-detect concentrations of several parameters because the RDLs for these COPCs exceeded the applicable Alberta Groundwater Remediation Guidelines for a commercial, non-potable site. These parameters included acenaphthene (2018-MW27 and 2018-MW31), acenaphthylene (2018-MW26), anthracene (2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW27, 2018-MW31 and 2018-MW50), benzo(a)anthracene (2018-MW17, 2018-MW26, 2018-MW27, 2018-MW31 and 2018-MW50), benzo(a)pyrene (2018-MW26, 2018-MW27 and 2018-MW31), benzo(g,h,i)perylene (2018-MW26), dibenzo(a,h)anthracene (2018-MW26), fluoranthene (2018-MW50), indeno(1,2,3-c,d) pyrene (2018-MW26), naphthalene (2018-MW17 and 2018-MW50), phenanthrene (2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW31 and 2018-MW50) and pyrene (2018-MW18 and 2018-MW20).

Dissolved Metals in Groundwater

Dissolved metals analysis was conducted on 12 groundwater samples collected from the Camp / Antenna Areas and AES Compound a as part of the current investigation (2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). Results of the laboratory analysis of the groundwater samples for metals are presented in Table F.14 in Appendix F.

Concentrations of various metals were detected in the groundwater samples. The following exceedances were observed:

- The concentrations of aluminum in groundwater samples 2018-MW01 (330 µg/L) and 2018-MW17 (130 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 100 µg/L.

- The concentrations of cadmium in groundwater samples 2018-MW17 (0.050 µg/L) and 2018-MW31 (0.052 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 0.040 µg/L.
- The concentrations of iron in groundwater samples 2018-MW01 (880 µg/L), 2018-MW14 (1,700 µg/L), and 2018-MW20 (360 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 300 µg/L.
- The concentrations of lead in groundwater samples 2018-MW01 (1.4 µg/L), 2018-MW14 (36 µg/L), 2018-MW17 (2.9 µg/L) and 2018-MW20 (74 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 1.0 µg/L or 2.0 µg/L (depending on water hardness).

None of the remaining detected concentrations of metals in the groundwater samples exceeded the applicable guidelines, where such guidelines exist. Note that the guidelines for aluminum, cadmium, lead and nickel in groundwater are dependent on the pH or hardness of the sample and as such, may change between site locations.

PCBs in Groundwater

PCB analysis was conducted on 12 groundwater samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-MW01, 2018-MW09, 2018-MW11, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW27, 2018-MW31, 2018-MW32 and 2018-MW50). Results of the laboratory analysis of groundwater samples for PCBs are presented in Table F.15 in Appendix F.

PCBs were detected in one (1) groundwater sample analyzed (2018-MW09) at a concentration of 0.23 µg/L, which exceeds the OMOE guideline of 0.2 µg/L. It is suspected that the exceedance of PCBs in groundwater sample 2018-MW09 is likely associated with suspended solids due to low-level detected PCB concentrations in soil in the area based on sample BB-TP26-BS1 collected during the Phase II ESA. Non-detected concentrations of PCBs in groundwater sample 2018-MW27 and 2018-MW32 had RDLs exceeding the OMOE guideline due to matrix/co-extractive interference during laboratory analysis. PCBs were not detected in the other groundwater samples analyzed.

4.3.4.3 Sediment Analytical Results

Petroleum Hydrocarbons in Sediment

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on three (3) sediment samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SED07, 2018-SED08, and 2018-SED09). Results of the laboratory analysis of sediment samples for petroleum hydrocarbons are presented in Table F.16 in Appendix F.

Concentrations of TPH and BTEX parameters were not above the laboratory reportable detection limits in the sediment samples analyzed.

PAHs in Sediment

PAH analysis was conducted on two (2) sediment samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SED07 and 2018-SED09). Results of the laboratory analysis of sediment samples for PAHs are presented in Table F.17 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the sediment samples analyzed.

Metals in Sediment

Metals analysis was conducted on three (3) sediment samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SED07, 2018-SED08, and 2018-SED09). Results of the laboratory analysis of the sediment samples for metals are presented in Table F.18 in Appendix F.

Concentrations of various metals were detected in the samples. None of the detected concentrations of metals in sediment exceeded the applicable guidelines, where such guidelines exist.

PCBs in Sediment

PCB analysis was conducted on one (1) sediment sample collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SED08). Results of the laboratory analysis of the sediment sample for PCBs are presented in Table F.14 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the sediment sample analyzed.

4.3.4.4 Surface Water Analytical Results

Petroleum Hydrocarbons in Surface Water

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on three (3) surface water samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SW07, 2018-SW08, and 2018-SW09). Results of the laboratory analysis of the surface water samples for petroleum hydrocarbons are presented in Table F.20 in Appendix F.

TPH and BTEX parameters were not above the laboratory reportable detection limits in the surface water samples analyzed.

General Chemistry in Surface Water

General chemistry analysis was conducted on three (3) surface water samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SW07, 2018-SW08, and 2018-SW09). Results of the laboratory analysis of the surface water sample for general chemistry are presented in Table F.21 in Appendix F.

The detected concentrations of general chemistry parameters in surface water were within the applicable guidelines, where such guidelines exist.

Total Metals in Surface Water

Total metals analysis was conducted on three (3) surface water samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-SW07, 2018-SW08, and 2018-SW09). Results of the laboratory analysis of the surface water sample for metals are presented in Table F.24 in Appendix F.

Various dissolved metals were detected in the surface water samples analyzed. The following exceedances were observed:

- The concentrations of aluminum in samples 2018-SW07 (150 µg/L) and 2018-SW08 (190 µg/L) exceeded the CCME FAL WQG of 100 µg/L.
- The concentration of iron in sample 2018-SW08 (380 µg/L) exceeded the CCME FAL WQG of 300 µg/L.

None of the remaining detected concentrations of total metals exceeded the applicable guidelines, where such guidelines exist.

4.3.4.5 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on two (2) vegetation samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-VEG01 and 2018-VEG02). Results of the laboratory analysis of the vegetation samples for metals are presented in Table F.26 in Appendix F.

Concentrations of various metals were detected in the vegetation samples analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on two (2) vegetation samples collected from the Camp / Antenna Areas and AES Compound as part of the current investigation (2018-VEG01 and 2018-VEG02). Results of the laboratory analysis of the vegetation samples for PCBs are presented in Table F.27 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation samples analyzed.

4.3.5 Summary of Exceedances

The current Phase III ESA and previous Phase II ESA identified several COPCs in environmental media at the Camp / Antenna Areas and AES Compound with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. The exceedances recorded in soil, groundwater, sediment, and surface water during the current and previous investigations are summarized in Table 4.3, 4.4, 4.5 and 4.6, respectively. Where an individual parameter exceeds more than one guideline, only the most conservative guideline is shown as the referenced guideline.

Table 4.3 Soil Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Sample Depth (mbgs)	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1,2,3]
BB-SS24	0.0 – 0.1	F2 Naphthalene	2,100 nd (0.040)	260 (Tier I ESL, Table 1a) 0.013 (CCME SQG)
BB-SS25	0.0 – 0.1	F3	4,560	1,700 (Tier I ESL, Table 1a)
BB-SS27	0.0 – 0.1	F2 TPH	6,300 7,800	260 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-SS29	0.0 – 0.1	F2 F3 TPH	4,300 1,820 6,100	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-SS33	0.0 – 0.1	F2 TPH	4,100 4,300	260 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-SS38	0.0 – 0.1	F2	814	260 (Tier I ESL, Table 1a)
BB-SS38 Lab-Dup	-	F2	934	260 (Tier I ESL, Table 1a)
BB-SS40	0.0 – 0.1	F2 Naphthalene	1,100 0.027	260 (Tier I ESL, Table 1a) 0.013 (CCME SQG)
BB-TP17-BS1	0.0 – 0.25	Naphthalene	0.023	0.013 (CCME SQG)
BB-TP17-BS2	0.25 – 0.5	F2 F3 TPH	4,600 2,900 7,600	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-TP20-BS2	0.25 – 0.5	F2 F3 TPH	2,900 3,010 6,000	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-TP201-BS2	0.25 – 0.5	F2 F3 TPH	3,200 3,070 6,300	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-TP22-BS2	0.25 – 0.5	F2	1,200	260 (Tier I ESL, Table 1a)
BB-TP221-BS2	0.25 – 0.5	F2	1,100	260 (Tier I ESL, Table 1a)
BB-TP23-BS2	0.25 – 0.5	F2	1,400	260 (Tier I ESL, Table 1a)
BB-TP24-BS2	0.25 – 0.5	F2	3,400	260 (Tier I ESL, Table 1a)
BB-TP25-BS2	0.25 – 0.5	F2	2,700	260 (Tier I ESL, Table 1a)
BB-TP25-BS2 Lab-Dup	-	F2	3,200	260 (Tier I ESL, Table 1a)
BB-TP26-BS1	0.0 – 0.25	Arsenic Zinc	45 900	26 (CCME SQG) 360 (CCME SQG)
BB-TP28-BS2	0.25 – 0.5	F2 TPH	5,600 6,400	260 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-TP31-BS2	0.25 – 0.5	F2 F3 TPH	32,000 2,900 35,000	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)

Table 4.3 Soil Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Sample Depth (mbgs)	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1,2,3]
2018-SS13 FLD-DUP	0.0 – 0.2	F2	700	260 (Tier I ESL, Table 1a)
2018-SS11	0.0 – 0.2	Copper	610	91 (CCME SQG)
2018-SS14	0.0 – 0.2	F2	2,500	260 (Tier I ESL, Table 1a)
2018-SS17	0.0 – 0.2	F2	550	260 (Tier I ESL, Table 1a)
2018-BH04-GP01	0.0 – 0.9	F2	3,000	260 (Tier I ESL, Table 1a)
2018-BH04-GP05	3.6 – 4.5	Naphthalene	0.38	0.013 (CCME SQG)
2018-BH12-GP08	6.3 – 7.2	TPH	5,800	4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
2018-BH15-GP08	6.3 – 7.2	TPH	2,300	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-BH25-GP07	5.4 – 6.3	TPH	1,400	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-BH28-GP02	0.9 – 1.8	TPH F2 Phenanthrene	1,100 900 0.088	870 (Tier I RBSL, Table 4a, gasoline impacts) 260 (Tier I ESL, Table 1a) 0.046 (CCME SQG)
2018-BH30-GP07	5.4 – 6.3	TPH	2,300	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-MW06-GP03	1.8 – 2.7	TPH	4,400	4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
2018-MW11-GP01	0.0 – 0.9	F2	420	260 (Tier I ESL, Table 1a)
2018-MW17-GP03	1.8 – 2.7	Phenanthrene	0.088	0.046 (CCME SQG)
2018-MW17-GP04	2.7 – 3.6	TPH	1,800	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-MW18-GP06	4.5 – 5.4	TPH	3,300	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-MW20-GP08	6.3 – 7.2	TPH	7,100	4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
2018-MW21-GP02	0.9 – 1.8	F2	620	260 (Tier I ESL, Table 1a)
2018-MW27-GP01	0.0 - 0.9	F2	720	260 (Tier I ESL, Table 1a)
2018-MW31-GP09	7.2 – 8.1	TPH	1,800	870 (Tier I RBSL, Table 4a, gasoline impacts)
2018-MW32-GP02	0.9 – 1.8	F2	1,500	260 (Tier I ESL, Table 1a)

Table 4.3 Soil Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Sample Depth (mbgs)	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1,2,3]
2018-MW32-GP09	7.2 – 8.1	TPH	5,300	4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
2018-MW50-GP04	2.7 – 3.6	Phenanthrene	0.097	0.046 (CCME SQG)
2018-MW50-GP05	3.6 – 4.5	TPH	7,000	4,000 (Tier I RBSL, Table 4a, fuel oil impacts)

Referenced Guidelines:
[1] Atlantic RBCA Tier I ESLs for the Protection of Plants and Soil Invertebrates, Table 1a (2012 and updates)
[2] CCME SQGs for the Protection of Environmental and Human Health for Commercial land use (1999 and updates)
[3] Atlantic Partnership in RBCA Tier I RBSLs for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil/lube oil impacts, Table 4a (2012 and updates)

Table 4.4 Groundwater Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1, 2, 3, 4, 5]
2018-MW01	Aluminum Iron Lead	330 880 1.4	100 (AENV Guidelines for Groundwater) 300 (AENV Guidelines for Groundwater) 1.0 (AENV Guidelines for Groundwater)
2018-MW09	PCBs	0.23	0.2 (Ontario MOE Groundwater Standards, Table 9)
2018-MW11	pH	2.75	6.5 – 9.0 (unitless) (AENV Guidelines for Groundwater)
2018-MW14	TPH Iron Lead Naphthalene	10 1,700 36 110	0.84 (Tier I ESL, Table 3a) 300 (AENV Guidelines for Groundwater) 1.0 (AENV Guidelines for Groundwater) 1.1 (AENV Guidelines for Groundwater)
2018-MW17	TPH F2 Aluminum Cadmium Lead Pyrene	65 59 130 0.050 2.9 0.059	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b) 3.1 (Tier I ESL, Table 2) 100 (AENV Guidelines for Groundwater) 0.040 (AENV Guidelines for Groundwater) 1.0 (AENV Guidelines for Groundwater) 0.025 (AENV Guidelines for Groundwater)
2018-MW18	TPH F2 Naphthalene	24 20 56	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b) 3.1 (Tier I ESL, Table 2) 1.1 (AENV Guidelines for Groundwater)
2018-MW20	TPH F2 Iron Lead Fluorene Naphthalene	44 38 360 74 3.7 130	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b) 3.1 (Tier I ESL, Table 2) 300 (AENV Guidelines for Groundwater) 1.0 (AENV Guidelines for Groundwater) 3 (AENV Guidelines for Groundwater) 1.1 (AENV Guidelines for Groundwater)

Table 4.4 Groundwater Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1, 2, 3, 4, 5]
2018-MW26	TPH	100	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b)
	F2	88	3.1 (Tier I ESL, Table 2)
	1-Methylnaphthalene	1,600	1,500 (AENV Guidelines for Groundwater)
	2-Methylnaphthalene	1,800	1,500 (AENV Guidelines for Groundwater)
	Acenaphthene	270	5.8 (AENV Guidelines for Groundwater)
	Anthracene	2.2	0.012 (AENV Guidelines for Groundwater)
	Chrysene	1.6	1.4 (AENV Guidelines for Groundwater)
	Fluoranthene	2.8	0.04 (AENV Guidelines for Groundwater)
	Fluorene	190	3 (AENV Guidelines for Groundwater)
	Naphthalene	150	1.1 (AENV Guidelines for Groundwater)
	Phenanthrene	170	0.4 (AENV Guidelines for Groundwater)
	Pyrene	3.6	0.025 (AENV Guidelines for Groundwater)
2018-MW27	TPH	180	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b)
	F2	170	3.1 (Tier I ESL, Table 2)
	2-Methylnaphthalene	1,700	1,500 (AENV Guidelines for Groundwater)
	Fluoranthene	0.19	0.04 (AENV Guidelines for Groundwater)
	Fluorene	57	3 (AENV Guidelines for Groundwater)
	Naphthalene	460	1.1 (AENV Guidelines for Groundwater)
	Phenanthrene	25	0.4 (AENV Guidelines for Groundwater)
	Pyrene	0.26	0.025 (AENV Guidelines for Groundwater)
2018-MW31	TPH	68	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b)
	F2	58	3.1 (Tier I ESL, Table 2)
	Cadmium	0.052	0.040 (AENV Guidelines for Groundwater)
	Fluoranthene	0.12	0.04 (AENV Guidelines for Groundwater)
	Fluorene	3.5	3 (AENV Guidelines for Groundwater)
	Naphthalene	110	1.1 (AENV Guidelines for Groundwater)
	Pyrene	0.26	0.025 (AENV Guidelines for Groundwater)
2018-MW32	TPH	71	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b)
	F2	64	3.1 (Tier I ESL, Table 2)
	Anthracene	2.6	0.012 (AENV Guidelines for Groundwater)
	Fluorene	5.0	3 (AENV Guidelines for Groundwater)
	Naphthalene	210	1.1 (AENV Guidelines for Groundwater)
	Phenanthrene	2.3	0.4 (AENV Guidelines for Groundwater)
2018-MW50	TPH	59	0.84/20 (Tier I ESL, Table 3a/Tier I RBSL, Table 4b)
	F2	50	3.1 (Tier I ESL, Table 2)
	pH	6.03	6.5 – 9.0 (unitless) (AENV Guidelines for Groundwater)
	Fluorene	3.8	3 (AENV Guidelines for Groundwater)
	Pyrene	0.17	0.025 (AENV Guidelines for Groundwater)

Referenced Guidelines:

[1] Alberta Environmental Groundwater Remediation Guidelines

[2] Atlantic PIRI Tier I ESLs for Plant and Soil invertebrate Direct Contact with Shallow Groundwater (Table 2)

[3] Atlantic PIRI Tier I ESLs for the Protection of Freshwater and Marine Aquatic Life (Table 3a)

[4] Atlantic PIRI Tier I RBSLs for Groundwater (Table 4b)

[5] Ontario MOE Groundwater Standards (Table 9)

Table 4.5 Surface Water Sample Exceedances – Camp / Antenna Areas and AES Compound

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1]
2018-SW07	Aluminum	150	100 (CCME WQG)
2018-SW08	Aluminum Iron	190 380	100 (CCME WQG) 300 (CCME WQG)

Referenced Guidelines:

[1] Canadian Council of Ministers of the Environment (CCME) WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)

The approximate extents of PHC, PAH, and metals impacts in soil and surface water at the Camp / Antenna Areas and AES Compound are shown on Drawing No. 121414998-EE-04 in Appendix A. The approximate extents of PHC, PAH, metals and PCB impacts in groundwater at the Camp / Antenna Areas and AES Compound are shown on Drawing No. 121414998-EE-05 in Appendix A.

5.0 UNKNOWN FOUNDATION / BUILDING

5.1 Site Description

The Unknown Foundation / Building is located from the eastern edge of the airstrip to the shores of Ashuapun Lake approximately 225 m east of the airstrip. The use of this area as it relates to former military operations is not known. Site surfaces consist of lichen and low-lying shrub covering sandy soil. This location includes part of the airstrip, a foundation from an unknown building along the shore of Ashuapun Lake, and a ruined building adjacent to the foundation. Locations of these features are shown in Drawing No. 121414998-EE-06 in Appendix A. This area also includes some gravel trails and Innu buildings along the southern shoreline; these areas were not assessed as part of the current investigation.

5.2 Description of Site Work

Field work at the Unknown Foundation / Building consisted of two (2) auger probe holes and the collection of one (1) surface soil sample. The sample locations and general site features are shown on Drawing No. 121414998-EE-06 in Appendix A.

The laboratory analysis schedule completed for Unknown Foundation / Building is presented in Table 5.1.

Table 5.1 Summary of Laboratory Work – Lower Site – Unknown Foundation / Building

Sample Locations	Sample Matrix
	Soil
Soil: 2018-SS50, 2018-AP1-BS2, 2018-AP2-BS1	Soil TPH/BTEX (3), PAHs (1), Metals (1)

5.3 Results

5.3.1 Sub-surface Conditions

Conditions encountered in the auger probe holes are summarized below.

5.3.1.1 Stratigraphy

The stratigraphy in the auger probe holes generally consisted of a well-graded, brown sand with gravel material. Bedrock or groundwater were not encountered in the auger probe holes.

5.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining, odours, and free liquid phase petroleum hydrocarbons were not observed on soil in the auger probe holes.

5.3.3 Laboratory Analytical Results

Results of the laboratory analysis of soil for the identified COPCs are presented in Appendix F and are summarized below. The corresponding analytical reports from Maxxam Analytics in Appendix G.

5.3.3.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on three (3) soil samples collected from the Unknown Foundation / Building as part of the current investigation (2018-SS50, 2018-AP1-BS2, and 2018-AP2-BS1). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

TPH was detected in three (3) soil samples analyzed at concentrations ranging from 17 mg/kg in 2018-SS50 and 2018-AP2-BS1 to 20 mg/kg in 2018-AP1-BS2. The laboratory analytical reports indicated that products impacting the samples generally resembled either a possible lube oil fraction or unidentified compounds in the lube oil range. The detected concentrations of TPH did not exceed the applicable Tier I RBSL for a commercial site with non-potable groundwater, coarse grained soil, and lube oil impacts of 10,000 mg/kg. The detected concentrations of TPH were also below the applicable Tier I ESLs for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) and for the Protection of Wildlife and Livestock (Table 1b, RBCA 2015).

BTEX parameters were not above the laboratory reportable detection limits in the samples.

PAHs in Soil

PAH analysis was conducted on one (1) soil sample collected from the Unknown Foundation / Building as part of the current investigation (2018-AP2-BS1). Results of the laboratory analysis of the soil sample for PAHs are presented in Table F.5 in Appendix F.

PAHs were not above the laboratory reportable detection limits in the soil sample analyzed.

Metals in Soil

Metals analysis was conducted on two (2) soil samples collected from the Unknown Foundation / Building as part of the current investigation (2018-SS50 and 2018-AP2-BS1). Results of the laboratory analysis of the soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the soil samples. None of the detected concentrations of metals in soils exceeded the applicable guidelines for a commercial site, where such guidelines exist.

5.3.4 Summary of Exceedances

The Phase III ESA did not identify COPCs in environmental media at the Unknown Foundation / Building with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. An exceedance was recorded in surface water during the previous Phase II ESA and is summarized in Table 5.2.

Table 5.2 Surface Water Sample Exceedances – Unknown Foundation / Building

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)1
BB-SW9	Aluminum	160	100 (CCME WQG)
Referenced Guidelines: [1] CCME WQGs for the Protection of Freshwater Aquatic Life (1999 and updates).			

The location of metals exceedance at the Unknown Foundation / Building is shown on Drawing No. 121414998-EE-06 in Appendix A.

6.0 WASTE DISPOSAL SITES

6.1 Site Description

The Waste Disposal Sites are located to the southwest of the airstrip. Site surfaces consist of gravel, lichen, and small shrubs. During site operations, empty drums and solid waste were disposed in unlined landfills (Site#1 and Site#2, respectively). Stressed vegetation was noted in the immediate area of Site#1 and Site#2. General debris and refuse were also reportedly disposed in open trenches (Site#3) adjacent to an unnamed pond. This location also contains other buried debris, a former Search and Rescue (SAR) drum storage area, and three unnamed ponds. Locations of these features are shown in Drawing No. 121414998-EE-07 in Appendix A. A previous investigation by JWEL (2002) at the former SAR fuel cache (labelled as “Former SAR Drum Storage Area” on Drawing No. 121414998-EE-07 in Appendix A) noted upward of 1,000 drums at Site#1; observations made during the Phase II ESA and the current assessment are consistent with previously reported drum quantities.

6.2 Description of Site Work

Field work at the Waste Disposal Sites consisted of the drilling of 10 boreholes (with five (5) completed as groundwater monitor wells), the collection of three (3) surface soil samples, two (2) sediment samples with corresponding surface water samples, five (5) groundwater samples, two (2) vegetation samples, and the emptying and moving of drums and tanks identified during the Phase II ESA. Approximately 150 drums emptied from the Site have been stored along the northwest ledge of the Drum Disposal Area (Site #1) for future processing. There are currently upward of 1,150 drums at the Drum Disposal Site. The sample locations and general site features are shown on Drawing No. 121414998-EE-07 in Appendix A.

The laboratory analysis schedule completed for the Waste Disposal Sites is presented in Table 6.1.

Table 6.1 Summary of Laboratory Work – Waste Disposal Sites

Sample Locations	Sample Matrix		
	Soil/ Sediment	Water	Vegetation
Soil: 2018-SS19, 2018-SS20, 2018-SS21, 2018-MW33-GP01, 2018-MW33-GP03, 2018-MW34-GP01, 2018-MW34-GP02, 2018-MW37-GP01, 2018-MW37-GP02, 2018-MW37-GP03, 2018-MW38-GP01, 2018-MW38-GP02, 2018-MW38-GP08, 2018-MW39-GP01, 2018-MW39-GP02, 2018-MW39-GP03, 2018-MW40-GP01, 2018-MW40-GP02, 2018-MW41-GP01, 2018-MW41-GP02, 2018-MW41-GP06, 2018-MW49-GP01, 2018-MW49-GP02, 2018-BH35-GP01, 2018-BH35-GP06, 2018-BH36-GP01, 2018-BH36-GP02 *Groundwater:* 2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39, and 2018-MW41 *Sediment:* 2018-SED03 and 2018-SED04 *Surface Water:* 2018-SW03 and 2018-SED04 *Vegetation:* 2018-VEG05 and 2018-VEG06	Soil TPH/BTEX (16), PAHs (10), Metals (14), PCB (5) Sediment TPH/BTEX (2), PAHs (2), Metals (2), PCB (2)	Groundwater TPH/BTEX (5), General Chemistry (5), PAH (5), Metals (5), PCBs (5) Surface Water TPH/BTEX (2), General Chemistry (2), Metals (2)	Vegetation Metals (2), PCBs (2)

6.3 Results

6.3.1 Sub-surface Conditions

Conditions encountered in the boreholes and monitor wells are described in detail on the Borehole and Monitor Well Records in Appendix E and are summarized below.

6.3.1.1 Stratigraphy

The stratigraphy in the boreholes generally consisted of a well-graded, brown sand with gravel material. Refusal on probable frozen ground or an unknown obstacle occurred at 5.2 mbgs in borehole 2018-BH36 and 4.7 mbgs in borehole 2018-MW49. Bedrock was not encountered in the boreholes.

6.3.1.2 Groundwater Observations

The groundwater levels measured in the monitor wells on July 19, 2018 ranged from 0.991 mbgs in 2018-MW34 to 4.582 mbgs in 2018-MW41. Groundwater levels at the Site are expected to vary seasonally and in response to individual precipitation/melting events. A summary of measured groundwater elevations at the Waste Disposal Sites is shown in Table 6.2.

Table 6.2 Groundwater Elevations – Waste Disposal Sites

Monitor Well	Ground Elevation (m)	July 2018	
		Groundwater Depth (mbgs)	Groundwater Elevation (m)
2018-MW33	448.257	1.682	446.575
2018-MW34	447.584	0.991	446.593
2018-MW37	449.302	1.190	448.112
2018-MW39	449.571	1.934	447.637
2018-MW41	449.254	4.582	444.672

Groundwater was either not encountered, or have depths estimated based on sample moisture for the remaining boreholes. Based on the measured groundwater elevations throughout the Lower Site, the direction of shallow groundwater flow in the Waste Disposal Sites area is generally to the south. The groundwater flow direction is shown on Drawing No. 121414998-EE-03 in Appendix A. The depths to groundwater recorded in the boreholes and monitor wells are presented on the Borehole and Monitor Well Records in Appendix E.

6.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining was observed on surface soils in the vicinity of 2018-SS21.

Light petroleum hydrocarbon sheen was observed on surface water when sediment was disturbed during collection of 2018-SED03.

Strong petroleum hydrocarbon odours were detected in soil in monitor well 2018-MW41.

6.3.3 Soil Vapour Concentrations

Headspace soil vapour concentrations were measured in duplicate soil sample jars for samples collected from the boreholes using a PID. Headspace soil vapour concentrations are not regulated; however, they are used as a screening tool to indicate the possible presence of volatile petroleum products (i.e., gasoline, and, to a lesser extent, diesel and fuel oil). Soil vapour concentrations vary with both fuel type and age and are not directly equivalent to soil analytical results.

The headspace soil vapour concentrations measured in borehole soil samples collected from the Site ranged from non-detect in multiple samples to 292 ppm_v in sample 2018-MW41-GP02. PID readings for each sample are included on the Borehole and Monitor Well Records in Appendix E.

6.3.4 Laboratory Analytical Results

Results of the laboratory analysis of soil, groundwater, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix F and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix G.

6.3.4.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on 16 soil samples collected from the Waste Disposal Sites as part of the current investigation (2018-SS19, 2018-SS20, 2018-SS21, 2018-MW33-GP01, 2018-MW34-GP01, 2018-MW37-GP01, 2018-MW38-GP02, 2018-MW38-GP08, 2018-MW39-GP01, 2018-MW39-GP03, 2018-MW40-GP01, 2018-MW41-GP01, 2018-MW41-GP06, 2018-MW49-GP01, 2018-BH35-GP06, and 2018-BH36-GP01). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

Petroleum hydrocarbon fractionation (TPH Fract./BTEX) was conducted on one (1) soil sample collected from the Waste Disposal Sites as part of the current investigation (2018-MW41-GP01). Results of the laboratory analysis of soil samples for petroleum hydrocarbon fractionation are presented in Table F.2 in Appendix F.

TPH was detected in three (3) of the 16 soil samples analyzed at concentrations ranging from 26 mg/kg to 4,200 mg/kg. The laboratory analytical reports indicated that products impacting the samples generally resembled either a mixture of the gasoline range, fuel oil range, and/or lube oil fraction or there were unidentified compounds in the lube oil range. The detected concentration of TPH in sample 2018-MW41-GP01 (4,200 mg/kg) exceeded the applicable Tier I RBSL (4000 mg/kg). The chromatogram in one (1) sample collected from the Waste Disposal Sites did not return to baseline. This can be indicative of the presence of heavier hydrocarbon fractions in the soil. However, based on historical site activities, anthropogenic presence of heavier hydrocarbon fractions is not expected at the site.

BTEX parameters were not detected in the soil samples analyzed.

Concentrations of hydrocarbon fractions F1 and F3 exceeded the applicable Tier I ESLs for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) (320 mg/kg and 1,700 mg/kg, respectively) in soil sample 2018-MW41-GP01 (740 mg/kg and 2,900 mg/kg, respectively).

PAHs in Soil

PAH analysis was conducted on 10 soil samples collected from the Waste Disposal Sites as part of the current investigation (2018-SS19, 2018-SS20, 2018-SS21, 2018-BH36-GP01, 2018-MW33-GP01, 2018-MW34-GP02, 2018-MW37-GP03, 2018-MW38-GP01, 2018-MW39-GP02 and 2018-MW41-GP02). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

One or more PAH parameters were detected in one (1) of the 10 soil samples analyzed. The detected concentrations of individual PAH parameters in the samples analyzed were below the applicable CCME SQGs for a commercial site for the protection of environmental health and the applicable guidelines for the protection of human health from other jurisdictions, where such guidelines exist. The calculated B[a]P TPEs were below the applicable CCME SQG (all land uses).

The RDP for napthalene in soil sample 2018-MW41-GP02 exceeded the CCME guideline due to matrix/co-extractive interference during laboratory analysis. Based on exceedances of applicable guidelines for naphthalene in two other samples collected from the Waste Disposal Sites (historical soil sample BB-TP16-BS1 (Stantec, 2018) and groundwater sample 2018-MW39 (see Section 6.3.4.2)), the area surrounding 2018-MW41 is carried forward as a potential exceedance of naphthalene for delineation purposes.

Metals in Soil

Metals analysis was conducted on 14 soil samples collected from the Waste Disposal Sites as part of the current investigation (2018-SS20, 2018-SS21, 2018-BH35-GP01, 2018-BH36-GP02, 2018-MW33-GP03, 2018-MW34-GP01, 2018-MW37-GP01, 2018-MW38-GP02, 2018-MW39-GP01, 2018-MW39-GP03, 2018-MW40-GP02, 2018-MW41-GP02, 2018-MW49-GP01 and 2018-MW49-GP02). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the 14 samples. None of the detected concentrations of metals in soils exceeded the applicable guidelines for a commercial site, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on 5 (five) soil samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33-GP01, 2018-MW37-GP02, 2018-MW38-GP01, 2018-MW39-GP02 and 2018-MW40-GP01). Results of the laboratory analysis of soil samples for PCBs are presented in Table F.7 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the soil samples.

6.3.4.2 Groundwater Analytical Results

Petroleum Hydrocarbons in Groundwater

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on five (5) groundwater samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39 and 2018-MW41). Results of the laboratory analysis of the groundwater samples for petroleum hydrocarbons are presented in Table F.11 in Appendix F.

TPH was detected in one (1) groundwater sample (2018-MW39) analyzed at a concentration of 1.5 mg/L. The laboratory analytical report indicated that products impacting the sample resembled a mixture of the gasoline range and the fuel oil range. The detected concentration of TPH did not exceed the applicable Tier I RBSL for a commercial site with non-potable groundwater, coarse grained soil, and fuel oil/lube oil

impacts of 20 mg/L or the Tier I ESLs for the Protection of Freshwater and Marine Aquatic Life (Table 3a, RBCA 2015).

One (1) to three (3) BTEX parameters were detected in samples 2018-MW37 and 2018-MW39. The detected concentrations of BTEX parameters were below the applicable Tier I RBSLs for a commercial site with non-potable groundwater and coarse-grained soil.

General Chemistry in Groundwater

General chemistry analysis was conducted on five (5) groundwater samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39 and 2018-MW41). Results of the laboratory analysis of the groundwater samples for general chemistry are presented in Table F.12 in Appendix F.

pH measured in three (3) of the analyzed samples (2018-MW34, 2018-MW37 and 2018-MW39) ranging from 5.84 to 6.24 fall outside the applicable guideline of 6.5 to 9.0. The other detected concentrations of general chemistry parameters in groundwater were within the applicable guidelines, where such guidelines exist.

PAHs in Groundwater

PAH analysis was conducted on five (5) groundwater samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39 and 2018-MW41). Results of the laboratory analysis of groundwater samples for PAHs are presented in Table F.13 in Appendix F.

Concentrations of one (1) to four (4) PAH parameters were detected in samples 2018-MW34 and 2018-MW39. The concentration of naphthalene in groundwater sample 2018-MW39 (15 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 1.1 µg/L. The RDLs of two PAH parameters in groundwater sample 2018-MW39 had RDLs exceeding the applicable guidelines due to matrix/co-extractive interference during laboratory analysis.

None of the other detected concentrations of PAH parameters in groundwater exceeded the applicable guidelines, where such guidelines exist.

Dissolved Metals in Groundwater

Dissolved metals analysis was conducted on five (5) groundwater samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39 and 2018-MW41). Results of the laboratory analysis of the groundwater samples for metals are presented in Table F.14 in Appendix F.

Concentrations of various metals were detected in the groundwater samples. The following exceedances were observed:

- The concentrations of aluminum in groundwater samples 2018-MW33 (160 µg/L) and 2018-MW39 (220 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 100 µg/L.
- The concentration of cadmium in groundwater sample 2018-MW33 (0.041 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 0.040 µg/L.
- The concentration of nickel in groundwater sample 2018-MW34 (3.6 µg/L) exceeded the Alberta Groundwater Remediation Guideline Value of 2.4 µg/L.

None of the remaining detected concentrations of metals in groundwater exceeded the applicable guidelines, where such guidelines exist. Note that the guidelines for aluminum, cadmium, lead and nickel in groundwater are dependent on the pH or hardness of the sample and, as such, may change between site locations.

PCBs in Groundwater

PCB analysis was conducted on five (5) groundwater samples collected from the Waste Disposal Sites as part of the current investigation (2018-MW33, 2018-MW34, 2018-MW37, 2018-MW39 and 2018-MW41). Results of the laboratory analysis of groundwater samples for PCBs are presented in Table F.15 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the groundwater samples analyzed.

6.3.4.3 Sediment Analytical Results

Petroleum Hydrocarbons in Sediment

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on two (2) sediment samples collected from the Waste Disposal Sites as part of the current investigation (2018-SED03 and 2018-SED04). Results of the laboratory analysis of sediment samples for petroleum hydrocarbons are presented in Table F.16 in Appendix F.

TPH were detected in one of the sediment samples at a concentration of 55 mg/kg in sample 2018-SED03. The laboratory analytical report indicated that the product impacting the sample resembled the possible lube oil range. The concentration of TPH in sample 2018-SED03 exceeded the applicable Tier I ESL for the Protection of Freshwater Aquatic Life – typical sediment type, and lube oil impacts of 43 mg/kg. TPH was not detected in the other sediment sample analyzed.

BTEX parameters were not above the laboratory reportable detection limits in the sediment samples analyzed.

PAHs in Sediment

PAH analysis was conducted on two (2) sediment samples collected from the Waste Disposal Sites as part of the current investigation (2018-SED03 and 2018-SED04). Results of the laboratory analysis of sediment samples for PAHs are presented in Table F.17 in Appendix F.

Concentrations of three (3) PAH parameters were detected in sample 2018-SED03. None of the detected concentrations of PAH parameters in sediment exceeded the applicable guidelines, where such guidelines exist.

Metals in Sediment

Metals analysis was conducted on two (2) sediment samples collected from the Waste Disposal Sites as part of the current investigation (2018-SED03 and 2018-SED04). Results of the laboratory analysis of sediment samples for metals are presented in Table F.18 in Appendix F.

Concentrations of various metals were detected in both samples. None of the detected concentrations of metals in sediment exceeded the applicable guidelines, where such guidelines exist.

PCBs in Sediment

PCB analysis was conducted on two (2) sediment samples collected from the Waste Disposal Sites as part of the current investigation (2018-SED03 and 2018-SED04). Results of the laboratory analysis of sediment samples for PCBs are presented in Table F.19 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the sediment samples analyzed.

6.3.4.4 Surface Water Analytical Results

Petroleum Hydrocarbons in Surface Water

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on two (2) surface water samples collected from the Waste Disposal Sites as part of the current investigation (2018-SW03 and 2018-SW04). Results of the laboratory analysis of surface water samples for petroleum hydrocarbons are presented in Table F.20 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the surface water samples.

General Chemistry in Surface Water

General chemistry analysis was conducted on two (2) surface water samples collected from the Waste Disposal Sites as part of the current investigation (2018-SW03 and 2018-SW04). Results of the laboratory analysis of surface water samples for general chemistry are presented in Table F.21 in Appendix F.

pH measured in the two (2) samples of 6.06 to 6.20 fall outside the applicable guideline of 6.5 to 9.0.

The other detected concentrations of general chemistry parameters in surface water were within the applicable guidelines, where such guidelines exist.

Metals in Surface Water

Metals analysis was conducted on two (2) surface water samples collected from the Waste Disposal Sites as part of the current investigation (2018-SW03 and 2018-SW04). Results of the laboratory analysis of surface water samples for metals are presented in Table F.22 in Appendix F.

Concentrations of various metals were detected in both samples. The following exceedances were observed:

- The concentrations of aluminum in surface water samples 2018-SW03 (21 µg/L) and 2018-SW04 (74 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 5 µg/L.
- The concentration of cadmium in surface water sample 2018-SW03 (0.12 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 0.04 µg/L.
- The concentration of copper in surface water sample 2018-SW03 (4.5 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 2 µg/L.
- The concentration of lead in surface water sample 2018-SW03 (1.7 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 1 µg/L.

None of the remaining detected concentrations of metals in surface water exceeded the applicable CCME Water Quality Guidelines, where such guidelines exist. Note that the guidelines for aluminum, cadmium, copper, and lead in surface water are dependent on the pH or hardness of the sample and, as such, may change between site locations.

6.3.4.5 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on two (2) vegetation samples collected from the Waste Disposal Sites as part of the current investigation (2018-VEG05 and 2018-VEG06). Results of the laboratory analysis of vegetation samples for metals are presented in Table F.23 in Appendix F.

Concentrations of various metals were detected in the vegetation samples analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on two (2) vegetation samples collected from the Waste Disposal Sites as part of the current investigation (2018-VEG05 and 2018-VEG06). Results of the laboratory analysis of vegetation samples for PCBs are presented in Table F.24 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation samples.

6.3.5 Summary of Exceedances

The previous Phase II ESA and the current Phase III ESA identified several COPCs in environmental media at the Waste Disposal Sites with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. The exceedances recorded in soil, groundwater, sediment,

and surface water during the current and previous investigations are summarized in Tables 6.3, 6.4, 6.5 and 6.6, respectively.

Table 6.3 Soil Sample Exceedances – Waste Disposal Sites

Sample No.	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1, 2, 3]
BB-TP16-BS1	Naphthalene Phenanthrene	0.11 0.55	0.013 (CCME SQG) 0.046 (CCME SQG)
BB-TP16-BS2	F2	1,800	260 (Tier I ESL, Table 1a)
BB-TP161-BS2	F2	2,000	260 (Tier I ESL, Table 1a)
2018-MW41-GP01	F1 F3 TPH	740 2,900 4,200	320 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Tabla 4a, fuel oil impacts)

Referenced Guidelines:

[1] CCME SQGs for the Protection of Environmental and Human Health for Commercial land use (1999 and updates)

[2] Atlantic Partnership in RBCA Tier I ESLs for the Protection of Plants and Soil Invertebrates, Table 1a (2012 and updates)

[3] Atlantic Partnership in RBCA Tier I RBSLs for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil/lube oil impacts, Table 4a (2012 and updates)

Table 6.4 Groundwater Sample Exceedances – Waste Disposal Sites

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1]
2018-MW33	Aluminum Cadmium Iron	160 0.041 330	100 (AENV Guidelines for Groundwater) 0.040 (AENV Guidelines for Groundwater) 300 (AENV Guidelines for Groundwater)
2018-MW34	pH Nickel	6.24 3.6	6.5 – 9.0 (unitless) (AENV Guidelines for Groundwater) 2.4 (AENV Guidelines for Groundwater)
2018-MW37	pH	6.03	6.5 – 9.0 (unitless) (AENV Guidelines for Groundwater)
2018-MW39	pH Aluminum Naphthalene	5.84 220 15	6.5 – 9.0 (unitless) (AENV Guidelines for Groundwater) 5 (AENV Guidelines for Groundwater) 1.1 (AENV Guidelines for Groundwater)

Referenced Guidelines:

[1] Alberta Environmental Groundwater Remediation Guidelines

Table 6.5 Sediment Sample Exceedances – Waste Disposal Sites

Sample No.	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1]
BB-SED12	TPH	83	43 (Tier I ESL, Table 4)
2018-SED03	TPH	55	43 (Tier I ESL, Table 4)

Referenced Guidelines:

[1] Atlantic Partnership in RBCA Tier I Sediment ESLs for the Protection of Freshwater and Marine Aquatic Life – Typical sediment type for lube oil, Table 4 (July 2012, January 2015)

Table 6.6 Surface Water Sample Exceedances – Waste Disposal Sites

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1,2,3]
BB-SW10	pH Aluminum Iron Lead	5.93 (unitless) 450 640 1.2	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water) 5 (CCME WQG) 300 (CCME WQG) 1 (CCME WQG)
BB-SW11	pH	6.18	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water)
BB-SW11 Lab-Dup	pH	6.06	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water)
BB-SW12	TPH pH Aluminum Cadmium Copper Iron Lead Zinc	0.98 (mg/L) 5.69 6,000 0.91 38 8,000 38 54	0.1 (mg/L) (Tier I ESL, Table 3a) 6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water) 5 (CCME WQG) 0.04 (CCME WQG) 2 (CCME WQG) 300 (CCME WQG) 1 (CCME WQG) 30 (CCME WQG)
2018-SW03	pH Aluminum Cadmium Copper Lead	6.06 21 0.12 4.5 1.7	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water) 5 (CCME WQG) 0.04 (CCME WQG) 2 (CCME WQG) 1 (CCME WQG)
2018-SW04	pH Aluminum	6.2 74	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water) 5 (CCME WQG)

Referenced Guidelines:

[1] Alberta Environmental Quality Guidelines for Surface Waters (2014)

[2] Canadian Council of Ministers of the Environment (CCME) WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)

[3] Atlantic Partnership in RBCA Tier I ESLs for the Protection of Freshwater and Marine Aquatic Life, Table 3a (2012 and updates)

The approximate extents of PHC, pH, PAH, and metals impacts in soil, sediment, and surface water at the Waste Disposal Sites are shown on Drawing No. 121414998-EE-07 in Appendix A. The approximate extents of pH, PAH, and metals impacts in groundwater at the Waste Disposal Sites are shown on Drawing No. 121414998-EE-08 in Appendix A.

7.0 FORMER INNU CAMP

7.1 Site Description

The Former Innu Camp lies to the south of the airstrip, to the east of the Waste Disposal Sites, and on the shore of Ashuapun Lake. Site surfaces consist of gravel, lichen, with small shrubs along the shoreline. Construction debris (mostly wood) is scattered around two (2) wooden structures. The former purpose of the camp is not known. The camp is shown in Drawing No. 121414998-EE-09 in Appendix A.

7.2 Description of Site Work

Field work at the Former Innu Camp consisted of the drilling of one (1) borehole completed as a groundwater monitor well, the collection of four (4) surface soil samples, two (2) sediment samples with corresponding surface water samples, one (1) groundwater sample, and two (2) vegetation samples. Two drums identified in the ponds to the west of the camp were also emptied and moved to the Waste Disposal Sites as part of the current investigation. The sample locations and general site features are shown on Drawing No. 121414998-EE-09 in Appendix A.

The laboratory analysis schedule completed for the Former Innu Camp is presented in Table 7.1.

Table 7.1 Summary of Laboratory Work – Former Innu Camp

Sample Locations	Sample Matrix		
	Soil/Sediment	**Water**	**Vegetation**
Soil: 2018-SS26, 2018-SS27, 2018-SS28, 2018-SS29, 2018-MW46-GP01, 2018-MW46-GP04 *Groundwater:* 2018-MW46 *Sediment:* 2018-SED01 to 2018-SED02 *Surface Water:* 2018-SW01 to 2018-SW02 *Vegetation:* 2018-VEG07	Soil TPH/BTEX (5), PAHs (2), Metals (7), PCB (2) Sediment TPH/BTEX (2), PAHs (2), Metals (2), PCB (2)	Groundwater TPH/BTEX (1), General Chemistry (1), PAH (1), Metals (1), PCBs (1) Surface Water TPH/BTEX (2), General Chemistry (2), VOCs (2), PAH (2), Metals (2), PCBs (2)	Vegetation Metals (1), PCBs (1)

7.3 Results

7.3.1 Sub-surface Conditions

Conditions encountered in the monitor well are described in detail on the Borehole and Monitor Well Records in Appendix E and are summarized below.

7.3.1.1 Stratigraphy

The stratigraphy in the borehole generally consisted of a well-graded, brown sand with gravel material. Bedrock was not encountered in the borehole.

7.3.1.2 Groundwater Observations

The groundwater level measured in monitor well 2018-MW46 on July 19, 2018 was 3.689 mbgs. Groundwater levels at the Site are expected to vary seasonally and in response to individual precipitation/melting events.

Table 7.2 Groundwater Elevations – Former Innu Camp

Monitor Well	Ground Elevation (m)	July 2018	
		Groundwater Depth (mbgs)	Groundwater Elevation (m)
2018-MW46	449.02	3.689	445.330

Based on the measured groundwater elevations throughout the Lower Site, the direction of shallow groundwater flow in the Former Innu Camp area is to the east toward Ashuapun Lake. The groundwater flow direction is shown on Drawing No. 121414998-EE-03 in Appendix A. The depth to groundwater recorded in the monitor well is presented on the Borehole and Monitor Well Records in Appendix E.

7.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining or free liquid phase petroleum hydrocarbons were not observed on soil or in groundwater at the Former Innu Camp.

Hydrocarbon odours were not detected in soils sampled as part of the current investigation.

Liquid petroleum hydrocarbons identified in two (2) drums in ponds to the west of the camp were removed and incinerated.

7.3.3 Soil Vapour Concentrations

Headspace soil vapour concentrations were measured in duplicate soil sample jars for samples collected from the boreholes using a PID. Headspace soil vapour concentrations are not regulated; however, are used as a screening tool to indicate the possible presence of volatile petroleum products (i.e., gasoline, and, to a lesser extent, diesel and fuel oil). Soil vapour concentrations vary with both fuel type and age and are not directly equivalent to soil analytical results.

The headspace soil vapour concentrations measured in borehole soil samples collected from the Site ranged from non-detect in multiple samples to 0.1 ppm_v in sample 2018-MW46-GP06. PID readings for each sample are included on the Borehole and Monitor Well Records in Appendix E.

7.3.4 Laboratory Analytical Results

Results of the laboratory analysis of soil, groundwater, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix F and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix G.

7.3.4.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on five (5) soil samples collected from the Former Innu Camp as part of the current investigation (2018-SS26, 2018-SS27, 2018-SS28, 2018-SS29 and 2018-MW46-GP01). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the soil samples analyzed.

PAHs in Soil

PAH analysis was conducted on two (2) soil samples collected from the Former Innu Camp as part of the current investigation (2018-SS26 and 2018-SS28). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the soil samples analyzed.

Metals in Soil

Metals analysis was conducted on six (6) soil samples collected from the Former Innu Camp as part of the current investigation (2018-SS26, 2018-SS27, 2018-SS28, 2018-SS29, 2018-MW46-GP01 and 2018-MW46-GP04). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the soil samples. None of the detected concentrations of metals in soils exceeded the applicable guidelines for a commercial site, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on two (2) soil samples collected from the Former Innu Camp as part of the current investigation (2018-SS27 and 2018-SS29). Results of the laboratory analysis of soil samples for PCBs are presented in Table F.7 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the soil samples analyzed.

7.3.4.2 Groundwater Analytical Results

Petroleum Hydrocarbons in Groundwater

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) groundwater sample collected from the Former Innu Camp as part of the current investigation (2018-MW46). Results of the laboratory analysis of the groundwater sample for petroleum hydrocarbons are presented in Table F.11 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the groundwater sample analyzed.

General Chemistry in Groundwater

General chemistry analysis was conducted on one (1) groundwater sample collected from the Former Innu Camp as part of the current investigation (2018-MW46). Results of the laboratory analysis of the groundwater sample for general chemistry are presented in Table F.12 in Appendix F.

The detected concentrations of general chemistry parameters in the groundwater sample were within the applicable guidelines, where such guidelines exist.

PAHs in Groundwater

PAH analysis was conducted on one (1) groundwater sample collected from the Former Innu Camp as part of the current investigation (2018-MW46). Results of the laboratory analysis of the groundwater sample for PAHs are presented in Table F.13 in Appendix F.

PAHs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

Dissolved Metals in Groundwater

Dissolved metals analysis was conducted on one (1) groundwater sample collected from the Former Innu Camp as part of the current investigation (2018-MW46). Results of the laboratory analysis of the groundwater sample for metals are presented in Table F.14 in Appendix F.

Various dissolved metals were detected in the groundwater sample analyzed. None of the detected concentrations of dissolved metals exceeded the applicable guidelines, where such guidelines exist.

PCBs in Groundwater

PCB analysis was conducted on one (1) groundwater sample collected from the Former Innu Camp as part of the current investigation (2018-MW46). Results of the laboratory analysis of the groundwater sample for PCBs are presented in Table F.15 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

7.3.4.3 Sediment Analytical Results

Petroleum Hydrocarbons in Sediment

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on two (2) sediment samples collected from the Former Innu Camp as part of the current investigation (2018-SED01 and 2018-SED02). Results of the laboratory analysis of sediment samples for petroleum hydrocarbons are presented in Table F.16 in Appendix F.

TPH were detected in one of the sediment samples at a concentration of 30 mg/kg in sample 2018-SED02. The laboratory analytical report indicated that there were unidentified compounds in the lube oil range. The concentration of TPH in sample 2018-SED02 did not exceed the applicable Tier I ESL for the Protection of Freshwater Aquatic Life – typical sediment type, and lube oil impacts of 43 mg/kg. TPH was not detected in the other sediment sample analyzed.

BTEX parameters were not above the laboratory reportable detection limits in the sediment samples analyzed.

PAHs in Sediment

PAH analysis was conducted on two (2) sediment samples collected from the Former Innu Camp as part of the current investigation (2018-SED01 and 2018-SED02). Results of the laboratory analysis of sediment samples for PAHs are presented in Table F.17 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the sediment samples analyzed.

Metals in Sediment

Metals analysis was conducted on two (2) sediment samples collected from the Former Innu Camp as part of the current investigation (2018-SED01 and 2018-SED02). Results of the laboratory analysis of sediment samples for metals are presented in Table F.18 in Appendix F.

Concentrations of various metals were detected in both sediment samples. None of the detected concentrations of metals in sediment exceeded the applicable guidelines, where such guidelines exist.

PCBs in Sediment

PCB analysis was conducted on two (2) sediment samples collected from the Former Innu Camp as part of the current investigation (2018-SED01 and 2018-SED02). Results of the laboratory analysis of sediment samples for PCBs are presented in Table F.19 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the sediment samples analyzed.

7.3.4.4 Surface Water Analytical Results

Petroleum Hydrocarbons in Surface Water

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (2018-SW01 and 2018-SW02). Results of the laboratory analysis of surface water samples for petroleum hydrocarbons are presented in Table F.20 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the surface water samples analyzed.

General Chemistry in Surface Water

General chemistry analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (2018-SW01 and 2018-SW02). Results of the laboratory analysis of surface water samples for general chemistry are presented in Table F.21 in Appendix F.

pH measured in sample 2018-SW02 of 6.22 falls outside the applicable guideline of 6.5 to 9.0.

The other detected concentrations of general chemistry parameters in surface water were within the applicable guidelines, where such guidelines exist.

VOCs in Surface Water

VOC analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (2018-SW01 and 2018-SW02). Results of the laboratory analysis of surface water samples for VOCs are presented in Table F.22 in Appendix F.

VOC parameters were not above the laboratory reportable detection limits in the surface water samples analyzed.

PAHs in Surface Water

PAH analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (2018-SW01 and 2018-SW02). Results of the laboratory analysis of surface water samples for PAHs are presented in Table F.23 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the surface water samples analyzed.

Metals in Surface Water

Metals analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (BB-SW01 and BB-SW02). Results of the laboratory analysis of surface water samples for metals are presented in Table F.24 in Appendix F.

Concentrations of various metals were detected in both samples. The concentration of aluminum in surface water sample 2018-SW02 (150 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 5 µg/L. None of the remaining detected concentrations of metals in surface water exceeded the applicable CCME Water Quality Guidelines, where such guidelines exist. Note that the guidelines for aluminum, cadmium, copper, and lead in surface water are dependent on the pH or hardness of the sample and, as such, may change between site locations.

PCBs in Surface Water

PCB analysis was conducted on two (2) surface water samples collected from the Former Innu Camp as part of the current investigation (2018-SW01 and 2018-SW02). Results of the laboratory analysis of surface water samples for PCBs are presented in Table F.25 in Appendix F.

PCB parameters were not above the laboratory reportable detection limits in the surface water samples analyzed.

7.3.4.5 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on one (1) vegetation sample collected from the Former Innu Camp as part of the current investigation (2018-VEG07). Results of the laboratory analysis of the vegetation sample for metals are presented in Table F.26 in Appendix F.

Concentrations of various metals were detected in the vegetation sample analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on one (1) vegetation sample collected from the Former Innu Camp as part of the current investigation (2018-VEG07). Results of the laboratory analysis of vegetation sample for PCBs are presented in Table F.27 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation sample analyzed.

7.3.5 Summary of Exceedances

The Phase III ESA identified several COPCs in environmental media at the Former Innu Camp with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. The exceedances recorded in surface water during the current investigation are summarized in Table 7.3.

Table 7.3 Surface Water Sample Exceedances – Former Innu Camp

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)[1,2]
2018-SW02	pH Aluminum	6.22 150	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water) 5 (CCME WQG)

Referenced Guidelines:

[1] Alberta Environmental Quality Guidelines for Surface Waters (2014)

[2] Canadian Council of Ministers of the Environment (CCME) WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)

The approximate extents of metals impacts in surface water at the Former Innu Camp are shown on Drawing No. 121414998-EE-09 in Appendix A.

8.0 GENERAL DUMP SITE

8.1 Site Description

The General Dump Site is located to the southwest of the Waste Disposal Sites. Site surfaces consist of gravel, lichen, and small shrubs. The area consists of scattered refuse surrounding an open pit with occasional drums (empty). Stressed vegetation was observed along the slopes of the open pit. The General Dump Site is shown in Drawing No. 121414998-EE-10 in Appendix A.

8.2 Description of Site Work

Field work at the General Dump Site consisted of the drilling of four (4) boreholes (with one (1) completed as a groundwater monitor well), the collection of four (4) surface soil samples, one (1) sediment sample with a corresponding surface water sample, and two (2) vegetation samples. Empty drums in the area were moved to the Waste Disposal Sites for future processing. The sample locations and general site features are shown on Drawing No. 121414998-EE-10 in Appendix A.

The laboratory analysis schedule completed for the General Dump Site is presented in Table 8.1.

Table 8.1 Summary of Laboratory Work – General Dump Site

Sample Locations	Sample Matrix		
	Soil/Sediment	**Water**	**Vegetation**
Soil: 2018-SS22, 2018-SS23, 2018-SS24, 2018-SS25, 2018-BH44-GP01, 2018-BH44-GP02, 2018-BH44-GP06, 2018-BH45-GP01, 2018-BH45-GP02, 2018-MW42-GP01, 2018-MW42-GP02, 2018-MW43-GP01, 2018-MW43-GP07 *Groundwater:* 2018-MW43 *Sediment:* 2018-SED05 *Surface Water:* 2018-SW05 *Vegetation:* 2018-VEG03 and 2018-VEG04	Soil TPH/BTEX (9), PAHs (6), Metals (6), PCB (2) Sediment TPH/BTEX (1), Metals (1), PCB (1)	Groundwater TPH/BTEX (1), General Chemistry (1), PAH (1), Metals (1), PCBs (1) Surface Water TPH/BTEX (1), General Chemistry (1), VOCs (1), PAH (1), Metals (1), PCBs (1)	Vegetation Metals (2), PCBs (2)

8.3 Results

8.3.1 Sub-surface Conditions

Conditions encountered in the boreholes and monitor wells are described in detail on the Borehole and Monitor Well Records in Appendix E and are summarized below.

8.3.1.1 Stratigraphy

The stratigraphy in the boreholes generally consisted of a well-graded, brown sand with gravel material. Refusal on probable frozen ground occurred at 5.4 mbgs in borehole 2018-MW42. Bedrock was not encountered in the boreholes.

8.3.1.2 Groundwater Observations

The groundwater levels measured in monitor well 2018-MW43 on July 19, 2018 was 5.414 mbgs. Groundwater levels at the Site are expected to vary seasonally and in response to individual precipitation/melting events.

Table 8.2 Groundwater Elevations – General Dump Site

Monitor Well	Ground Elevation (m)	July 2018	
		Groundwater Depth (mbgs)	Groundwater Elevation (m)
2018-MW43	449.495	5.414	444.081

Based on local topography at the General Dump Site, the direction of shallow groundwater flow is to the west toward Ashuapun Lake. The depths to groundwater recorded in the boreholes and monitor wells are presented on the Borehole and Monitor Well Records in Appendix E.

8.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining or free liquid phase petroleum hydrocarbons were not observed on soil or in groundwater at the General Dump Site.

Hydrocarbon odours were not detected in soils sampled as part of the current investigation.

8.3.3 Soil Vapour Concentrations

Headspace soil vapour concentrations were measured in duplicate soil sample jars for samples collected from the boreholes using a PID. Headspace soil vapour concentrations are not regulated; however, are

used as a screening tool to indicate the possible presence of volatile petroleum products (i.e., gasoline, and, to a lesser extent, diesel and fuel oil). Soil vapour concentrations vary with both fuel type and age and are not directly equivalent to soil analytical results.

The headspace soil vapour concentrations measured in borehole soil samples collected from the site ranged from non-detect in multiple samples to 0.3 ppm_v in sample 2018-BH45-GP04. PID readings for each sample are included on the Borehole and Monitor Well Records in Appendix E.

8.3.4 Laboratory Analytical Results

Results of the laboratory analysis of soil, groundwater, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix E and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix F.

8.3.4.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on nine (9) soil samples collected from the General Dump Site as part of the current investigation (2018-SS22, 2018-SS23, 2018-SS24, 2018-SS25, 2018-BH44-GP01, 2018-BH45-GP01, 2018-MW42-GP01, 2018-MW43-GP01 and 2018-MW43-GP07). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

TPH was detected in one (1) of the nine (9) soil samples analyzed (2018-BH45-GP01) at a concentration of 24 mg/kg. The laboratory analytical report indicated that there were unidentified compounds in the lube oil range. The detected concentration of TPH did not exceed the applicable Tier I RBSLs.

BTEX parameters were not detected in the soil samples analyzed.

The detected concentration of hydrocarbon fraction F3 in sample 2018-BH45-GP01 did not exceed the applicable Tier I ESL for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) (1,700 mg/kg).

PAHs in Soil

PAH analysis was conducted on eight (8) soil samples collected from the General Dump Site as part of the current investigation (2018-SS22, 2018-SS23, 2018-SS24, 2018-SS25, 2018-BH44-GP02, 2018-BH45-GP02, 2018-MW42-GP01, and 2018-MW43-GP01). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the soil samples analyzed.

Metals in Soil

Metals analysis was conducted on six (6) soil samples collected from the General Dump Site as part of the current investigation (2018-SS26, 2018-SS27, 2018-SS28, 2018-SS29, 2018-MW46-GP01 and 2018-MW46-GP04). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the soil samples analyzed. None of the detected concentrations of metals in soils exceeded the applicable guidelines for a commercial site, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on two (2) soil samples collected from the General Dump Site as part of the current investigation (2018-SS23 and 2018-SS25). Results of the laboratory analysis of soil samples for PCBs are presented in Table F.7 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the soil samples analyzed.

8.3.4.2 Groundwater Analytical Results

Petroleum Hydrocarbons in Groundwater

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) groundwater sample collected from the General Dump Site as part of the current investigation (2018-MW43). Results of the laboratory analysis of the groundwater sample for petroleum hydrocarbons are presented in Table F.11 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the groundwater sample analyzed.

General Chemistry in Groundwater

General chemistry analysis was conducted on one (1) groundwater sample collected from the General Dump Site as part of the current investigation (2018-MW43). Results of the laboratory analysis of the groundwater sample for general chemistry are presented in Table F.12 in Appendix F.

The detected concentrations of general chemistry parameters in the groundwater sample analyzed were within the applicable guidelines, where such guidelines exist.

PAHs in Groundwater

PAH analysis was conducted on one (1) groundwater sample collected from the General Dump Site as part of the current investigation (2018-MW43). Results of the laboratory analysis of the groundwater sample for PAHs are presented in Table F.13 in Appendix F.

PAHs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

Dissolved Metals in Groundwater

Dissolved metals analysis was conducted on one (1) groundwater sample collected from the General Dump Site a as part of the current investigation (2018-MW43). Results of the laboratory analysis of the groundwater sample for metals are presented in Table F.14 in Appendix F.

Various dissolved metals were detected in the groundwater sample analyzed. None of the detected concentrations of dissolved metals exceeded the applicable guidelines, where such guidelines exist.

PCBs in Groundwater

PCB analysis was conducted on one (1) groundwater sample collected from the General Dump Site as part of the current investigation (2018-MW43). Results of the laboratory analysis of the groundwater sample for PCBs are presented in Table F.15 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the groundwater sample analyzed.

8.3.4.3 Sediment Analytical Results

Petroleum Hydrocarbons in Sediment

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) sediment sample collected from the General Dump Site as part of the current investigation (2018-SED05). Results of the laboratory analysis of the sediment sample for petroleum hydrocarbons are presented in Table F.16 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the sediment sample analyzed.

Metals in Sediment

Metals analysis was conducted on one (1) sediment sample collected from the General Dump Site as part of the current investigation (2018-SED05). Results of the laboratory analysis of the sediment sample for metals are presented in Table F.18 in Appendix F.

Concentrations of various metals were detected in the sediment sample analyzed. None of the detected concentrations of metals in sediment exceeded the applicable guidelines, where such guidelines exist.

PCBs in Sediment

PCB analysis was conducted on one (1) sediment sample collected from the General Dump Site as part of the current investigation (2018-SED05). Results of the laboratory analysis of the sediment sample for PCBs are presented in Table F.19 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the sediment sample analyzed.

8.3.4.4 Surface Water Analytical Results

Petroleum Hydrocarbons in Surface Water

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for petroleum hydrocarbons are presented in Table F.20 in Appendix F.

TPH and BTEX were not above the laboratory reportable detection limits in the surface water sample analyzed.

General Chemistry in Surface Water

General chemistry analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for general chemistry are presented in Table F.21 in Appendix F.

pH measured in the sample of 6.22 falls outside the applicable guideline of 6.5 to 9.0.

The other detected concentrations of general chemistry parameters in surface water were within the applicable guidelines, where such guidelines exist.

VOCs in Surface Water

VOC analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for VOCs are presented in Table F.22 in Appendix F.

VOC parameters were not above the laboratory reportable detection limits in the surface water sample analyzed.

PAHs in Surface Water

PAH analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for PAHs are presented in Table F.23 in Appendix F.

PAH parameters were not above the laboratory reportable detection limits in the surface water sample analyzed.

Metals in Surface Water

Metals analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for metals are presented in Table F.24 in Appendix F.

Concentrations of various metals were detected in the surface water sample. The following exceedances were observed:

- The concentration of aluminum in surface water sample 2018-SW05 (17 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 5 µg/L.
- The concentration of cadmium in surface water sample 2018-SW05 (0.12 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 0.04 µg/L.
- The concentration of copper in surface water sample 2018-SW05 (3.3 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 2.0 µg/L.
- The concentration of lead in surface water sample 2018-SW05 (1.6 µg/L) exceeded the CCME WQG for the Protection of Freshwater Aquatic Life of 1.0 µg/L.

None of the remaining detected concentrations of metals in the surface water sample exceeded the applicable CCME Water Quality Guidelines, where such guidelines exist. Note that the guidelines for aluminum, cadmium, copper, and lead in surface water are dependent on the pH or hardness of the sample and, as such, may change between site locations.

PCBs in Surface Water

PCB analysis was conducted on one (1) surface water sample collected from the General Dump Site as part of the current investigation (2018-SW05). Results of the laboratory analysis of the surface water sample for PCBs are presented in Table F.25 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the surface water sample analyzed.

8.3.4.5 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on two (2) vegetation samples collected from the General Dump Site as part of the current investigation (2018-VEG03 and 2018-VEG04). Results of the laboratory analysis of vegetation samples for metals are presented in Table F.26 in Appendix F.

Concentrations of various metals were detected in the vegetation samples analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on two (2) vegetation samples collected from the General Dump Site as part of the current investigation (2018-VEG03 and 2018-VEG04). Results of the laboratory analysis of vegetation samples for PCBs are presented in Table F.27 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation samples.

8.3.5 Summary of Exceedances

The current Phase III ESA identified several COPCs in environmental media at the General Dump Site with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. The exceedances recorded in surface water during the current investigation are summarized in Table 8.3.

Table 8.3 Surface Water Sample Exceedances – General Dump Site

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (µg/L)1,2
2018-SW05	pH	6.22	6.5 – 9.0 (unitless) (AENV Guidelines for Surface Water)
	Aluminum	17	5 (CCME WQG)
	Cadmium	0.12	0.04 (CCME WQG)
	Copper	3.3	2 (CCME WQG)
	Lead	1.6	1 (CCME WQG)
Referenced Guidelines: [1] Alberta Environmental Quality Guidelines for Surface Waters (2014) [2] Canadian Council of Ministers of the Environment (CCME) WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)			

The approximate extents of metals impacts in surface water at the General Dump Site are shown on Drawing No. 121414998-EE-10 in Appendix A.

9.0 UPPER SITE

9.1 Site Description

The Upper Site is located approximately 3 km west of the Lower Site, and approximately 170 m higher elevation than the Lower Site. Site surfaces consist of exposed bedrock, boulders, lichen, and till. Details of infrastructure at the Upper Site is limited, but it is assumed that during site operations, the Upper Site would have consisted of an operations building, an emergency shelter, and four communication antennae. The operations building would have included a sleeping area, kitchen, power generation, and radio equipment. The power generator at the Upper Site was fueled by nine (9) ASTs. The Upper Site was destroyed in a fire in 1964 and the remaining infrastructure was razed, and the debris buried on-site as part of a 1987 decommissioning program. During the current investigation, the only infrastructure identified at the Upper Site consisted of several short concrete support pillars in the area of the former operations building and buried metal debris scattered across the Site. A small localized depression located at the south edge of the Upper Site appeared to collect surface water runoff from the Site. Locations of these features are shown on Drawing No. 121414998-EE-11 in Appendix A.

9.2 Description of Site Work

Field work at the Upper Site consisted of the collection of 19 surface soil samples and three (3) vegetation samples. The sample locations and general site features are shown on Drawing No. 121414998-EE-11 in Appendix A.

The laboratory analysis schedule completed for Upper Site is presented in Table 9.1.

Table 9.1 Summary of Laboratory Work – Upper Site

Sample Locations	Sample Matrix	
	Soil/Sediment	Vegetation
Soil: 2018-SS30 to 2018-SS48 *Vegetation:* 2018-VEG09 to 2018-VEG11	Soil TPH/BTEX (19), TPH Frac. (1), PAHs (8), Metals (9), PCB (1)	Vegetation Metals (3), PCBs (3)

9.3 Results

9.3.1 Surface Conditions

Conditions encountered in the collection of the surface soil samples are summarized below.

9.3.1.1 Stratigraphy

The stratigraphy in the surface soil samples generally consisted a silty sand till veneer with frequent cobbles and boulders directly overlying bedrock.

9.3.2 Free Liquid Phase Petroleum Hydrocarbons

Field evidence (i.e., staining, free liquid phase petroleum hydrocarbons, hydrocarbon odour) are indicative of impacts and are often used to direct selection of sample locations. As such, the presence or absence of field evidence is recorded for each area.

Staining or free liquid phase petroleum hydrocarbons were not observed on soil at the Upper Site.

A slight hydrocarbon odour was detected in soil in the vicinity of sample 2018-SS37.

9.3.3 Laboratory Analytical Results

Results of the laboratory analysis of soil, sediment, surface water, and vegetation samples for the identified COPCs are presented in Appendix E and are summarized below. The corresponding analytical reports from Maxxam Analytics and their sub-contractors are presented in Appendix F.

9.3.3.1 Soil Analytical Results

Petroleum Hydrocarbons in Soil

Petroleum hydrocarbon (TPH/BTEX) analysis was conducted on 19 soil samples collected from the Upper Site as part of the current investigation (2018-SS30, 2018-SS31, 2018-SS32, 2018-SS33, 2018-SS34, 2018-SS35, 2018-SS36, 2018-SS37, 2018-SS38, 2018-SS39, 2018-SS40, 2018-SS41, 2018-SS42, 2018-SS43, 2018-SS44, 2018-SS45, 2018-SS46, 2018-SS47 and 2018-SS48). Results of the laboratory analysis of soil samples for petroleum hydrocarbons are presented in Table F.1 in Appendix F.

Petroleum hydrocarbon fractionation (TPH Fract./BTEX) was conducted on one (1) soil sample collected from the Upper Site as part of the current investigation (2018-SS37). Results of the laboratory analysis of soil samples for petroleum hydrocarbon fractionation are presented in Table F.2 in Appendix F.

TPH was detected in 16 of the 19 soil samples analyzed at concentrations ranging from 17 mg/kg to 18,000 mg/kg. The laboratory analytical reports indicated that products impacting the samples generally resembled either unidentified compounds in the lube oil range, possible lube oil fraction, fuel oil range or a mixture of fuel oil range and lube oil fraction. The concentrations of TPH in samples 2018-SS35 (18,000 mg/kg) and 2018-SS37 (17,000 mg/kg) exceeded the applicable Tier I RBSL for a commercial site with non-potable groundwater, coarse grained soil, and lube oil impacts of 10,000 mg/kg. None of the remaining detected concentrations of TPH exceeded the applicable Tier I RBSLs. The chromatogram in three (3) samples collected from the Upper Site did not return to baseline. This can be indicative of the presence of heavier hydrocarbon fractions in the soil. However, based on historical site activities, anthropogenic presence of heavier hydrocarbon fractions is not expected at the site.

BTEX parameters were not detected in the soil samples.

A concentration of hydrocarbon fraction F2 exceeded the applicable Tier I ESL for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) (260 mg/kg) in soil sample 2018-SS35 (350 mg/kg). Concentrations of hydrocarbon fraction F3 exceeded the applicable Tier I ESLs for the Protection of Plants and Soil Invertebrates (Table 1a, RBCA 2015) (260 mg/kg and 1,700 mg/kg, respectively) in soil samples 2018-SS32 (4,860 mg/kg), 2018-SS35 (17,600 mg/kg) and 2018-SS37 (16,600 mg/kg). Concentrations of hydrocarbon fraction F3 also exceeded the applicable Tier I ESL for the Protection of Wildlife and Livestock (Table 1b, RBCA 2015) (16,000 mg/kg) in soil samples 2018-SS35 (17,600 mg/kg) and 2018-SS37 (16,600 mg/kg).

PAHs in Soil

PAH analysis was conducted on eight (8) soil samples collected from the Upper Site as part of the current investigation (2018-SS30, 2018-SS32, 2018-SS34, 2018-SS37, 2018-SS38, 2018-SS39, 2018-SS40 and 2018-SS41). Results of the laboratory analysis of soil samples for PAHs are presented in Table F.5 in Appendix F.

PAHs parameters were detected in one (1) of the eight (8) soil samples analyzed. None of the detected concentrations of PAHs in the soil samples analyzed exceeded the applicable guideline, where such guidelines exist.

Metals in Soil

Metals analysis was conducted on nine (9) soil samples collected from the Upper Site as part of the current investigation (2018-SS31, 2018-SS33, 2018-SS42, 2018-SS43, 2018-SS44, 2018-SS45, 2018-SS46, 2018-SS47, and 2018-SS48). Results of the laboratory analysis of soil samples for metals are presented in Table F.6 in Appendix F.

Concentrations of various metals were detected in the nine (9) samples analyzed. The following exceedances were observed:

- The concentration of antimony in soil sample 2018-SS46 (57 mg/kg) exceeded the CCME commercial SQG of 40 mg/kg.
- The concentration of chromium in soil sample 2018-SS46 (170 mg/kg) exceeded the CCME commercial SQG of 87 mg/kg.
- The concentrations of copper in soil samples 2018-SS46 (48,000 mg/kg) and 2018-SS47 (180 mg/kg) exceeded the CCME commercial SQG of 91 mg/kg.
- The concentration of lead in soil sample 2018-SS46 (2,100 mg/kg) exceeded the CCME commercial SQG of 600 mg/kg.
- The concentration of nickel in soil sample 2018-SS46 (510 mg/kg) exceeded the CCME commercial SQG of 89 mg/kg.
- The concentration of selenium in soil sample 2018-SS46 (240 mg/kg) exceeded the CCME commercial SQG of 2.9 mg/kg.
- The concentration of silver in soil sample 2018-SS46 (150 mg/kg) exceeded the CCME commercial SQG of 40 mg/kg.

- The concentration of tin in soil sample 2018-SS46 (1,500 mg/kg) exceeded the CCME commercial SQG of 300 mg/kg.
- The concentrations of zinc in soil samples 2018-SS46 (4,600 mg/kg) and 2018-SS47 (380 mg/kg) exceeded the CCME commercial SQG of 360 mg/kg.

None of the remaining detected concentrations of metals in soil exceeded the applicable CCME commercial SQGs, where such guidelines exist.

PCBs in Soil

PCB analysis was conducted on one (1) soil sample collected from the Upper Site as part of the current investigation (2018-SS39). Results of the laboratory analysis of the soil sample for PCBs are presented in Table F.7 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the soil sample analyzed.

9.3.3.2 Vegetation Analytical Results

Metals in Vegetation

Metals analysis was conducted on three (3) vegetation samples collected from the Upper Site as part of the current investigation (2018-VEG09, 2018-VEG10 and 2018-VEG11). Results of the laboratory analysis of vegetation samples for metals are presented in Table F.26 in Appendix F.

Concentrations of various metals were detected in the vegetation samples analyzed. There are no applicable guidelines for metals in vegetation.

PCBs in Vegetation

PCB analysis was conducted on three (3) vegetation samples collected from the Upper Site as part of the current investigation (2018-VEG09, 2018-VEG10 and 2018-VEG11). Results of the laboratory analysis of vegetation samples for PCBs are presented in Table F.22 in Appendix F.

PCBs were not above the laboratory reportable detection limits in the vegetation samples analyzed.

9.3.4 Summary of Exceedances

The previous Phase II ESA and current Phase III ESA identified several COPCs in environmental media at the Upper Site with concentrations exceeding the applicable criteria-based guidelines for a commercial site, where such guidelines exist. The exceedances recorded in soil, sediment, and surface water during the previous and current investigations are summarized in Tables 9.2, 9.3, and 9.4, respectively. Where an individual parameter exceeds more than one guideline, only the most conservative guideline is shown as the referenced guideline.

Table 9.2 Soil Sample Exceedances – Upper Site

Sample No.	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1,2,3]
BB-SS46	F2 F3 TPH	790 30,100 31,000	260 (Tier I ESL, Table 1a) 1,700 (Tier I ESL, Table 1a) 4,000 (Tier I RBSL, Table 4a, fuel oil impacts)
BB-SS44	Cadmium Chromium Copper Nickel Silver Zinc	61 190 6,900 290 69 8,000	22 (CCME SQG) 87 (CCME SQG) 91 (CCME SQG) 89 (CCME SQG) 40 (CCME SQG) 360 (CCME SQG)
BB-TP41-BS1	Copper Zinc	530 1,000	91 (CCME SQG) 360 (CCME SQG)
BB-TP41-BS1 Lab-Dup	Copper Zinc	180 1,200	91 (CCME SQG) 360 (CCME SQG)
BB-TP41-BS1 Lab-Dup 2	Copper	470	91 (CCME SQG)
2018-SS32	F3	4,900	1,700 (Tier I ESL, Table 1a)
2018-SS35	TPH F2 F3	18,000 350 18,000	10,000 (Tier I RBSL, Table 4a) 260 (Tier I ESL, Table 1a) 1,700/16,000 (Tier I ESL, Tables 1a/1b)
2018-SS37	TPH F2 F3	17,000 280 17,000	10,000 (Tier I RBSL, Table 4a) 260 (Tier I ESL, Table 1a) 1,700/16,000 (Tier I ESL, Tables 1a/1b)
2018-SS46	Antimony Chromium Copper Lead Nickel Selenium Silver Tin Zinc	57 170 48,000 2,100 510 240 150 1,500 4,600	40 (CCME SQG) 87 (CCME SQG) 91 (CCME SQG) 600 (CCME SQG) 89 (CCME SQG) 2.9 (CCME SQG) 40 (CCME SQG) 300 (CCME SQG) 360 (CCME SQG)
2018-SS47	Copper Zinc	180 380	91 (CCME SQG) 360 (CCME SQG)

Referenced Guidelines:

[1] Atlantic Partnership in RBCA Tier I ESLs for the Protection of Plants and Soil Invertebrates, Table 1a (2012 and updates)

[2] Atlantic Partnership in RBCA Tier I RBSLs for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil/lube oil impacts, Table 4a (2012 and updates)

[3] CCME SQGs for the Protection of Environmental and Human Health for Commercial land use (1999 and updates)

Table 9.3 Sediment Sample Exceedances – Upper Site

Sample No.	Parameter	Conc. (mg/kg)	Referenced Guidelines (mg/kg)[1,2]
BB-SED5	TPH	33,000	25 (Tier I ESL, Table 4)
BB-SED51	TPH 2-Methylnaphthalene	5,900 0.23	25 (Tier I ESL, Table 4) 0.201 (CCME PEL)
Referenced Guidelines: [1] Atlantic Partnership in RBCA Tier I Sediment ESLs for the Protection of Freshwater and Marine Aquatic Life – Typical sediment type for fuel oil, Table 4 (July 2012, January 2015) [2] CCME Sediment Quality Guidelines for the Protection of Aquatic Life – Probably Effects Levels for Freshwater Sediment (PEL) (1999 and updates)			

Table 9.4 Surface Water Sample Exceedances – Upper Site

Sample No.	Parameter	Conc. (µg/L)	Referenced Guidelines (mg/L)[1]
BB-SW5	Aluminum	180	5 (CCME WQG)
Referenced Guidelines: [1] Canadian Council of Ministers of the Environment (CCME) WQGs for the Protection of Freshwater Aquatic Life (1999 and updates)			

The approximate extents of PHC, PAH, and metals impacts in soil, sediment, and surface water at the Upper Site are shown on Drawing No. 121414998-EE-11 in Appendix A.

10.0 SUMMARY OF EXCEEDANCES AND DISCUSSION

10.1 Summary of Exceedances

The Phase II and III ESAs identified several COPCs in environmental media at the Site with concentrations exceeding the applicable guidelines for a commercial site, where such guidelines exist. Based on the identified areas of impacted media, volumes of impacted soil and sediment were estimated, and areas of impacted groundwater were estimated. The following assumptions were made when calculating volume and area estimates:

- Estimated areas of impacted material (m^2) were taken from Drawings No. 121414998-EE-03 to 121414998-EE-11 in Appendix A. Further delineation would be required to refine these areas (larger or smaller);
- For initial soil estimations, an impacted radius of 5 m was assumed for individual areas of exceedances. In areas where an impacted sample was adjacent to a non-impacted sample, the limits of impacts are drawn halfway between the samples or with a radius of 5 m; whichever is smaller (exceptions for exceedances at depth near clean surface soil samples);
- For groundwater estimations, an impacted radius of 10 m was assumed for individual areas of exceedances. In areas where an impacted sample was adjacent to a non-impacted sample, the limits of impacts are drawn halfway between the sample or with a radius of 10 m; whichever is smaller;
- The depth and thickness of impacted soil at the Lower Site is uniform across each individual impacted area based on the deepest sample collected within that area;
- Impacts identified at or near the groundwater table are assumed to extend 1.0 m below the groundwater table. Groundwater depth is assumed based on the nearest groundwater measurement;
- The depth of impacted soil at the Upper Site extends to bedrock, which is estimated to be approximately 0.5 m; and,
- The depth of impacts in freshwater sediment was assumed to be 0.15 m.

The estimated volumes (m^3) of impacted soil and sediment and areas (m^2) of impacted groundwater identified at the Site during the Phase II and III ESA are summarized in Table 10.1. At the request of NLDMAE, impacts identified within the boundary of the parcels of land granted to the Government of Canada in 1998 were to be presented separately herein. However, no impacts in environmental media were identified within the aforementioned boundary during the Phase II and III ESA.

Impacted areas that contain two or more COPCs have volumes listed for each individual COPC in Table 10.1 but are only counted once for the total volume estimate.

Table 10.1 Volume / Area Estimates

COPC	Media	Area ID	Impacted Samples	Volume/Area of Impacted Material
Petroleum Hydrocarbons	Soil	Camp / Antenna Areas and AES Compound	BB-SS40, BB-TP31, 2018-SS03, 2018-BH04, BB-TP28, BB-SS33, 2018-MW06, BB-SS29, BB-TP25, 2018-BH12, BB-TP24, 2018-BH15, 2018-MW17, 2018-MW50, BB-SS27, BB-SS38, BB-TP20, BB-TP22, BB-TP23, 2018-BH25, 2018-MW20, 2018-MW21, 2018-SS17, BB-SS24, BB-SS25, BB-SS26, BB-TP17, 2018-SS14, 2018-BH28, 2018-BH30, 2018-MW27, 2018-MW32	13,745 m^3
		Waste Disposal Sites	BB-TP16 2018-MW41	156 m^3
		Upper Site	BB-SS46, 2018-SS32, 2018-SS35, 2018-SS37	59 m^3
	Freshwater Sediment	Waste Disposal Sites	BB-SED12, 2018-SED03	23 m^3
		Former Innu Camp	2018-SED02	12 m^3
		Upper Site	BB-SED5	5 m^3
	Surface Water	Waste Disposal Sites	BB-SW12	Unknown+
	Groundwater	Camp / Antenna Areas and AES Compound	2018-MW27, 2018-MW31, 2018-MW32, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW50	3,359 m^2
		Waste Disposal Sites	2018-MW39	313 m^2
PAHs	Soil	Camp / Antenna Areas and AES Compound	BB-SS40, BB-TP31, 2018-BH04, 2018-MW02, 2018-MW17, 2018-MW50, BB-SS24, BB-TP17, 2018-BH28, 2018-MW32	1,742 m^3
		Waste Disposal Sites	BB-TP16, 2018-MW41	234 m^3
	Freshwater Sediment	Upper Site	BB-SED5	5 m^3
	Groundwater	Camp / Antenna Areas and AES Compound	2018-MW27, 2018-MW31, 2018-MW32, 2018-MW14, 2018-MW17, 2018-MW18, 2018-MW20, 2018-MW26, 2018-MW50	3,359 m^2
		Waste Disposal Sites	2018-MW39	313 m^2

Table 10.1 Volume / Area Estimates

COPC	Media	Area ID	Impacted Samples	Volume/Area of Impacted Material
Metals	Soil	Camp / Antenna Areas and AES Compound	BB-TP26, 2018-SS11	100 m^3
		Upper Site	BB-SS44, BB-TP41, 2018-SS46, 2018-SS47	143 m^3
	Surface Water	Lower Site – General Area	BB-SW2	Unknown+
		Camp / Antenna Areas and AES Compound	2018-SW07, 2018-SW08	Unknown+
		Unknown Foundation / Building	BB-SW9	Unknown+
		Waste Disposal Sites	BB-SW10, BB-SW11, 2018-SW03, 2018-SW04	Unknown+
		Former Innu Camp	2018-SW02	Unknown+
		General Dump Site	2018-SW05	Unknown+
		Upper Site	BB-SW5	Unknown+
	Groundwater	Camp / Antenna Areas and AES Compound	2018-MW01, 2018-MW14, 2018-MW17, 2018-MW20, 2018-MW31	1,734 m^2
		Waste Disposal Sites	2018-MW39, 2018-MW33, 2018-MW34	1,418 m^2
PCBs	Groundwater	Camp / Antenna Areas and AES Compound	2018-MW09	313 m^2
Totals			**Soil / Sediment**	**14,398 m^3***
			Groundwater	**5,716 m^2***

Notes:
*Overlapping COPCs are only counted once
+Areal extent of surface water impacts was not calculated for Ashuapun Lake or for large ponds – further delineation is required

10.2 Discussion

Based on the current investigation, concentrations of petroleum hydrocarbons, metals, PAHs, and PCBs in soil, groundwater, sediment and/or surface water on the site exceed the applicable guidelines presented in the Phase II ESA. Further assessment or remediation is therefore recommended. A human health risk assessment has been conducted and is presented in Section 11.0. An ecological risk assessment has been conducted and is presented in Section 12.0.

11.0 HUMAN HEALTH RISK ASSESSMENT

The human health risk assessment (HHRA) process generally follows a widely-recognized framework that progresses from a qualitative initial Problem Formulation step, through Exposure and Toxicity Assessments. The process culminates in a quantitative Risk Characterization step, followed by an Uncertainty Evaluation to discuss the uncertainties inherent in the HHRA process. Conclusions and Recommendations are presented after the uncertainty evaluation.

The primary guidance for conducting the HHRA is that of Atlantic PIRI and Health Canada, including:

- Atlantic Risk Based Corrective Action (RBCA) for Petroleum Impacted Sites in Atlantic Canada, User Guidance, Version 3 (Atlantic PIRI, 2012, updated 2015)
- Federal Contaminated Site Risk Assessment in Canada Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 2.0 (Health Canada, 2010a)
- Federal Contaminated Site Risk Assessment in Canada Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors, Version 2.0 (Health Canada, 2010b)
- Federal Contaminated Site Risk Assessment in Canada Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRAChem; Health Canada, 2010c)

11.1 Problem Formulation

The objective of the Problem Formulation is the development of a focused understanding of which substances constitute contaminants of potential concern (COPCs), what human receptors are likely to be present at the site, and how COPCs migrate from the source(s) and ultimately reach, and are taken up by, the human receptors at the Site. This information is summarized in a human health conceptual site model, which provides a visual depiction of the relevant pathways linking COPCs in various environmental media to the human receptors of interest in the HHRA.

Due to the geographical separation between the Upper Site and the Lower Site, the potential risk at each site is assessed separately. The Upper Site is located approximately 3 km west of the Lower Site atop a mountain approximately 650 m asl. The rough terrain and remote location limits access to the Upper Site and as a result, human exposure in this area is considered negligible. The Upper Site was therefore not considered further in the human health risk assessment. The remainder of the HHRA will focus on the Lower Site.

11.1.1 Identification of COPCs

COPCs for human health were identified by screening the maximum reported chemical concentrations in soil, groundwater, sediment, and surface water against applicable human health-based guidelines.

Where duplicate samples were collected (or laboratory duplicate samples were analyzed), the sample with the highest concentration (on an analyte by analyte basis) was considered representative for the sample location. Where a chemical did not have an applicable human health-based guideline and is below the

RDL, the chemical is reasonably assumed to be present at the site at concentrations that would not result in unacceptable risks. In these cases, the chemical is not carried forward for further assessment.

Based on information presented previously, including the proximity to various water bodies, lack of access restrictions (e.g., fencing), and the potential for occasional recreational users in the vicinity, commercial guidelines for coarse-grained surface soils are considered appropriate for screening. A description of the screening process is provided in the following sections of the report.

11.1.1.1 COPCs in Soil

For the determination of human health COPCs in soil for further assessment in the HHRA, maximum concentrations of BTEX and TPH were screened against the lowest applicable pathway-specific screening level (PSSL) from Atlantic PIRI (2012, updated 2015). For metals and PAHs, human health guidelines from the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2015) were applied. In the absence of CCME or Atlantic PIRI human health pathway-specific guidelines, the lowest applicable human health guidelines from the following alternate sources were employed:

1. Alberta Environment and Parks (AEP) Tier 1 Soil and Groundwater Remediation Guidelines for coarse soils (AEP, 2016): Direct Soil Contact, Commercial Land Use;
2. Ontario Ministry of the Environment and Climate Change (MOECC) Site Condition Standards (SCS); Soil Components for Table 3 Full Depth, Non-potable Water Scenario, for coarse textured soil (MOECC, 2011): Soil Contact, Residential Land Use; and,
3. USEPA Regional Screening Levels (RSLs) for Composite Worker Soil (USEPA, 2018); RSL values were divided by 5 to reflect differences between the USEPA and CCME approach to guideline derivation for non-carcinogens, as applicable.

Note that MOECC guidelines for Residential Land Use were applied since MOECC Commercial/Industrial guidelines do not consider the presence of children. Based on current and intended land use, pathway-specific guidelines considered applicable at the Site for BTEX/TPH include those protective of direct contact (i.e., soil ingestion, dermal contact, soil inhalation). Groundwater in the area is not used for potable purposes; therefore, soil guidelines protective of potable groundwater are not applicable. Vapour inhalation is considered an operable pathway if buildings are located within 30 m of volatile COPCs. With the exception of the Innu camp building, there are no occupied buildings located on the Border Beacon Site. The Innu camp buildings are not located near the impacted areas (i.e., located >250 m from suspected impacted areas). Therefore, soil guidelines protective of indoor air inhalation are not considered applicable.

As per CCME (2006) guidance, soil samples from grade to 1.5 m below ground surface are considered surface soil. Typically, only analytical results for surface soil samples would be carried forward to assess the soil ingestion/dermal contact pathway. If no surface soil samples were available at a sampling location, subsurface soil sample results would be carried forward to represent surface soil.

For the human health risk assessment, the maximum concentrations of COPC were initially compared to the screening guidelines (Table H.1, Appendix H) for dermal contact/soil ingestion. Note that some metals that have a low inherent toxicity (i.e., bismuth, calcium, magnesium, phosphorous, potassium, rubidium, and sodium) were excluded from evaluation and were not carried forward in the human health or ecological risk assessments.

If the maximum concentration exceeded the screening guideline and if the element was not considered a major mineral forming element or nutrient of low inherent toxicity, an exposure point concentration (EPC) was determined. The EPC is an estimate of a reasonable upper limit value for the average chemical concentration in the medium, determined for each exposure unit (USEPA, 1989; USEPA, 2013). It is considered likely that human receptors would frequent each of the areas of the Lower Site equally (i.e., there is no reason to expect that one area of the Lower Site would be frequented more heavily than others). Therefore, surface soil data from current and previous investigations for the entire Lower Site were pooled to establish an EPC. For the purposes of this HHRA, where sufficient sample size was permitted (i.e., n>10), the 95% upper confidence limit of the mean (UCLM) was calculated and used as the EPC for the direct soil contact pathway. The 95% UCLMs were calculated with the USEPA's ProUCL Version 5.1 statistical software using the recommended method. If data were insufficient to establish an UCLM, EPCs were represented by maxima. In the case of laboratory duplicates, field duplicates, or samples from multiple shallow depths, the samples with the highest concentrations at each location were used in the calculation of the EPC. Where a chemical was not detected in a sample, half the detection limit was used. EPCs are presented in Appendix H. If the EPC then exceeded the human health screening guideline, the COPC was carried forward in the HHRA.

As shown in Table H.1, Appendix H and summarized in Table 11.1, the maximum concentrations of antimony, arsenic, and TPH (fuel oil) in soil exceed the applicable screening guidelines. The EPCs for antimony, arsenic, and TPH (fuel oil); however, do not exceed the applicable screening guidelines as shown in Table H.1, Appendix H and summarized in Table 11.1. Therefore, there are no measured soil parameters carried forward as human health COPCs.

Table 11.1 Maximum Concentrations and Recommended EPCs for TPH, Antimony, and Arsenic

Chemical of Concern	Maximum (mg/kg)	EPC (mg/kg)	Screening Guideline	Recommended Best Fit
TPH (fuel oil)	35,000	2097	13,000	95% KM (Chebyshev) UCL
Antimony	19	2.7	7.5	95% Modified-(t) UCL
Arsenic	45	2.5	31	95% KM (t) UCL

11.1.1.2 COPCs in Groundwater

Generic groundwater guidelines for human health are limited to potable water (ingestion, dermal contact) and volatilization to indoor air. As discussed in Section 11.1.1.1, groundwater in the area is not use as a potable water supply and direct contact is not expected. Also, there are no buildings on site or within 5 m of the impacts that have been identified in the study area; therefore, volatilization to indoor air is not considered a complete exposure pathway. As there are no applicable human health exposure pathways for groundwater, no COPCs in groundwater have been carried forward in the HHRA.

11.1.1.3 COPCs in Sediment

Health Canada (2017) recommends that for low contact recreational use such as swimming or boating on a seasonal basis, sediment can be screened to available human health based residential/parkland soil quality guidelines for the relevant pathways. Maximum chemical concentrations in sediment were screened against the lowest applicable human health guidelines for soil (residential/parkland land use). Maximum concentrations of BTEX and TPH were screened against the lowest applicable pathway-specific screening level (PSSL) from Atlantic PIRI (2012, updated 2015). For metals and PAHs, human health guidelines from the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2015) were applied. In the absence of CCME or Atlantic PIRI human health pathway-specific guidelines, the lowest applicable human health guidelines from the following alternate sources were employed:

1. Alberta Environment and Parks (AEP) Tier 1 Soil and Groundwater Remediation Guidelines for coarse soils (AEP, 2016): Direct Soil Contact, Residential Land Use;
2. Ontario Ministry of the Environment and Climate Change (MOECC) Site Condition Standards (SCS); Soil Components for Table 3 Full Depth, Non-potable Water Scenario, for coarse textured soil (MOECC, 2011): Soil Contact, Residential Land Use; and,
3. USEPA Regional Screening Levels (RSLs) for Resident Soil (USEPA, 2018); RSL values were divided by 5 to reflect differences between the USEPA and CCME approach to guideline derivation for non-carcinogens, as applicable.

It was reasonably assumed that human receptors would only contact sediment from Ashuapun Lake. Other water bodies are not expected to contain fish and are not suitable for swimming/wading. It is considered unlikely that humans would access these water bodies.

As shown in Table H.2, Appendix H, with the exception of iron and manganese, maximum chemical concentrations in the sediment samples considered do not exceed the applicable human health-based screening guidelines. Health Canada (2017) reports manganese to be among the elements least toxic to mammals. Only exposure to extremely high concentrations from human-made sources has resulted in adverse human health effects (Health Canada, 2017). Similarly, iron is found naturally in the environment and is an essential element in the human diet and no evidence exists of dietary iron toxicity in the general population (Health Canada, 2017a, 2017b). Therefore, concentrations of iron and manganese in sediment are not expected to be a concern. There are no measured chemicals in sediment carried forward as human health COPCs.

11.1.1.4 COPCs in Surface Water

Surface water in Ashuapun Lake is reportedly used for washing by people using the Innu Camp. Drinking water, however, is reportedly brought to the camp. Given the proximity of the Lake to the Innu camp, it is possible that the lake may also be used for recreational purposes. Children visiting the camp may play along the shoreline. There are no fences or physical barriers preventing human contact with the water. Therefore, to identify potential COPCs associated with incidental exposure (i.e., incidental ingestion and dermal contact), maximum chemical concentrations in surface water were conservatively screened against applicable Health Canada Drinking Water Quality Guidelines (Health Canada, 2017).

In the absence of Health Canada guidelines, the lowest applicable guideline for drinking water from the following alternate sources were employed:

- Alberta Tier I Soil and Groundwater Remediation Guidelines; potable guideline for commercial land use and coarse-grained soils.
- Ontario Ministry of the Environment and Climate Change Site Condition Standards; GW1 Groundwater Components for Potable Water Scenario, for coarse-textured soil (MOECC 2011).
- USEPA Regional Screening Levels for Resident Tapwater (USEPA, 2016); RSL values were divided by 5 to reflect differences between the USEPA and CCME approach to guideline derivation for non-carcinogens, as applicable.

As discussed in Section 11.1.1.3 for sediment, it was reasonably assumed that human receptors would only contact sediment from Ashuapun Lake. Other water bodies are not expected to contain fish and are not suitable for swimming/wading. It is considered unlikely that humans would access these water bodies.

With the exception of iron, chemical concentrations in the surface water samples considered do not exceed the applicable human health-based screening guidelines. The water quality objective for iron is aesthetic and as noted by Health Canada (2017), no evidence exists of dietary iron toxicity in the general population. Therefore, there are no measured chemicals in surface water carried forward as human health COPCs.

11.2 Uncertainty Evaluation

Uncertainty is inherent in many aspects of evaluating human health risks. The level of uncertainty is dependent upon the availability and quality of information, as well as the variability associated with many of the processes and factors being considered. When conducting a risk assessment, it is standard practice to implement conservative assumptions (i.e., to make assumptions that over-state, rather than understate, the potential risk) when uncertainty is encountered. This strategy helps confirm that the HHRA conclusions are protective of human health. The limitations and assumptions applied in this HHRA are described in the following sections.

11.2.1 Data Limitations

The HHRA was based on data collected by Stantec in 2017 and 2018. The data were collected using targeting sampling that focused on impacted areas. Therefore, it is assumed that the targeted sampling locations encompass the maximum or near maximum concentrations of the chemicals tested.

11.2.2 Selection of COPCs

The primary concern regarding the selection of COPCs is that relevant contaminants will have been overlooked and thus omitted from consideration within the HHRA. This concern was addressed through the analysis of the parameters most likely to be present at the Site, and through the targeting collection of data that focused on impacted areas. As a result, it was assumed that the targeted sampling locations encompassed the maximum or near maximum concentrations of the chemicals tested. The probability that relevant contaminants were missed or omitted is considered low.

11.3 Conclusions and Recommendations

All chemicals have the potential to cause toxicological effects. However, the potential for an effect depends on the receptor (i.e., person) being exposed, the route and duration of exposure (e.g., oral exposure for chronic durations), and the concentration of the chemical (e.g., exceeds an applicable guideline).

Measured maximum and/or exposure point concentrations of chemicals in soil are below the applicable guidelines that are meant to be protective of human health. The maximum concentrations of chemicals in sediment and surface water at the Site are below the screening levels that are meant to be protective of human health. As such, the results of this HHRA indicate that chemicals in soil, sediment, and surface water at the Site are not expected to pose unacceptable toxicological risks to human receptors.

12.0 ECOLOGICAL RISK ASSESSMENT

The purpose of the ecological risk assessment (ERA) is to evaluate the potential for ecological receptors to be experiencing negative health effects because of exposure to existing chemicals of potential concern (COPCs) identified at the Site.

The ERA was conducted following a widely-recognized framework that progresses from an initial Problem Formulation, through Exposure and Toxicity Assessments, and culminates in a quantitative Risk Characterization that integrates the information from the previous three elements. Following this, the Conclusions and Recommendations stemming from the assessment are discussed. Each step also includes a discussion of the uncertainties inherent to that section of the ERA. The risk assessment methodology for the ERA considered guidance from the following documents:

- Federal Contaminated Sites Action Plan (FCSAP) Ecological Risk Assessment Guidance (Environment Canada, 2012)
- A Framework for Ecological Risk Assessment, General Guidance (CCME, 1996)
- A Framework for Ecological Risk Assessment, Technical Appendices (CCME, 1997)
- Guidelines for Ecological Risk Assessment (USEPA, 1998)

The focus of an ERA is typically to quantify the potential risks to ecological receptors at the population level rather than at the individual level, with the notable exception being for species protected under the *Species at Risk Act* or other legislation protective of rare or endangered wildlife. Changes in individual health do not necessarily equate to eventual changes in population health over time. For the purposes of the ERA, the primary assessment endpoint is the protection of wildlife populations based on predicted effects on growth, reproduction, or survival (Suter, 2007).

12.1 Problem Formulation

The objective of the Problem Formulation is the development of a focused understanding of which chemicals assessed during the Site characterization are ecological COPCs and how ecological receptors living at, near, or frequenting the Site may be exposed to the COPCs. This information is summarized in an ecological conceptual site model that provides a visual depiction of the relevant pathways linking the source(s) of COPCs in various environmental media and biota to the ecological receptors of interest.

12.1.1 Identification of Ecological COPCs

Considering the geographic separation between the Upper Site and the Lower Site (Drawing No. 121414998-EE-02, Appendix A), the sites were assessed separately. The Site characterization data used to identify Site and background concentrations for the Problem Formulation were collected by Stantec in 2017 and 2018. The complete data set is provided in Appendix F and a description of the screening process is provided in the following sections of this report.

Screening of groundwater concentrations was not conducted as the only exposure pathways of ecological receptors to groundwater on the Site is through direct contact of plants and soil invertebrates and through

discharge to aquatic receiving waters. Plants and soil invertebrates will be assessed qualitatively in Section 12.1.3. Analytical data for sediment and surface water are available and are screened in Sections 12.1.1.2 and 12.1.1.3. Therefore, groundwater was not considered further in this ERA.

Ecological COPCs at each Site were identified by screening the maximum reported chemical concentrations in soil, sediment, and surface water at the Site against applicable ecological health-based guidelines.

With the exception of a small pool of standing water, no water bodies exist at the Upper Site. The small pool of water is not expected to support aquatic life and is expected to dry up seasonally. Therefore, only COPCs in soil were considered at the Upper Site. Because the standing water would be expected to be dry seasonally, the sediment concentration detected in the pool of standing water was screened against the soil guidelines and included in the dataset for soil.

Several areas of pooled water exist at the Lower Site primarily in the Waste Disposal Area and the General Dump Site. These pools of water are not directly connected to Ashuapun Lake and based on their size and isolation, are not expected to contain fish. Therefore, for the assessment of aquatic receptors at the Lower Site, only the sediment and surface water data from Ashuapun Lake was considered relevant in the ecological screening. For the assessment of semi-aquatic birds and mammals at the Lower Site, if a COPC was carried forward in the ERA based on the soil screening, the concentrations of that COPC in the sediment and surface water samples from the standing pools of water were also considered.

12.1.1.1 COPCs in Soil

For the determination of ecological COPCs in soil, maximum chemical concentrations were screened against the lowest applicable ecological guideline from the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2016). For PHCs, maximum concentrations were screened against the lowest applicable ecological guideline from the Atlantic PIRI Tier I ESLs for Protection of Plants and Invertebrates (Direct Contact) and the Tier I ESL (wildlife). In the absence of CCME and Atlantic PIRI ecological pathway-specific guidelines, the lowest applicable ecological screening criteria from the following alternate sources were employed:

- Alberta Environment and Parks Tier 1 Soil and Groundwater Remediation Guidelines for coarse-grained soils (AEP, 2016).
- Ontario Ministry of the Environment and Climate Change Site Condition Standards; Soil Components for Table 3 Full Depth, Non-potable Water Scenario, for coarse-textured soil (MOECC, 2011).
- USEPA Ecological Soil Screening Levels; the lesser of Plants, Soil Invertebrates, Avian and Mammalian values (USEPA, 2007).

Pathway-specific guidelines considered applicable to the site include those protective of ecological soil contact, soil and food ingestion, and nutrient and energy cycling. Because surface water samples and sediment were available for screening, soil guidelines protective of aquatic life (i.e., migration from soil to groundwater to surface water) were not considered in the screening of soil concentrations.

As discussed, the Lower Site is located within 30 m of a waterbody. However, because soil data were only screened against guidelines protective of terrestrial exposure pathways (which do not change with distance

to a waterbody), Table 3 MOECC soil components for commercial land use were used in the screening where CCME and Alberta screening criteria were not available.

As per CCME (2006) guidance, soil samples from grade to 1.5 m below ground surface are considered surface soil. Typically, only surface soil samples would be carried forward to assess the soil ingestion/dermal contact pathway. If impacts were not delineated vertically at a Site (i.e., no surface soil samples available), subsurface soil sample results would be carried forward to assess these pathways.

For the ecological risk assessment, the maximum concentrations of COPCs in soil were initially compared to the screening guidelines (Tables I.1 (Lower Site) and I.2, Appendix I (Upper Site)). Note that some metals that have a low inherent toxicity (e.g., bismuth, calcium, magnesium, phosphorous, potassium, rubidium, and sodium) were excluded from evaluation and were not carried forward in the ecological risk assessment.

If the maximum concentration exceeded the screening guideline and if the element was not considered a major mineral forming element or nutrient of low inherent toxicity, an exposure point concentration was calculated. The exposure point concentration (EPC) is an estimate of a reasonable upper limit value for the average chemical concentration in the medium, determined for each exposure unit (USEPA, 1989; USEPA, 2013). EPCs are represented by maxima, where data are not suitable for EPC calculations or by upper confidence limits of the mean (UCLMs) (95% or above) calculated with ProUCL (Version 5.1) using data from the current and previous investigations. In the case of laboratory duplicates, field duplicates, or samples from multiple depths, the samples with the highest concentrations at each location were used in the calculation of the EPC. Where a chemical was not detected in a sample, half the detection limit was used. EPCs are presented in Appendix I. If the EPC then exceeded the human health screening guideline, the COPC was carried forward in the ERA.

COPC Screening – Soil – Lower Site

As shown in Table I.1, Appendix I, the maximum concentrations of several metals (arsenic, copper, lead, tin, and zinc) and TPH (fuel oil) in soil exceed the applicable screening guidelines. The EPCs for PHC F1, PHC F3, arsenic, copper, lead, tin, and zinc, however, do not exceed the applicable screening guidelines as shown in Table I.1, Appendix I. Table 12.1 presents the maximum concentrations and the EPCs based on the screening process outlined above and as shown in Table I.1, Appendix I.

Table 12.1 Maximum Concentrations and Recommended EPCs (Lower Site)

Chemical of Concern	Maximum (mg/kg)	EPC (mg/kg)	Screening Guideline	Recommended Best Fit
Petroleum Hydrocarbons				
PHC F1	620	33	210	95% KM Approximate Gamma UCL
PHC F2	32,000	1,300	150	95% KM Approximate Gamma UCL
PHC F3	4,600	176	300	KM H-UCL
Metals				
Arsenic	45	3.4	17	95% KM (t) UCL
Copper	610	41	63	95% KM (Chebyshev) UCL
Lead	180	27	70	95% Chebyshev (Mean, Sd) UCL
Tin	33	3.4	5	95% KM (Chebyshev) UCL
Zinc	900	92	250	95% Chebyshev (Mean, Sd) UCL

PHC F2 was identified as requiring further assessment in the ERA. Because of the cumulative effects of PHCs, all three fractions (PHC F1, F2, and F3) were carried forward for further assessment in the ERA. Concentrations of 1-methylnaphthalene and 2-methylnaphthalene were detected in soil samples from the Lower Site but there are no ecological screening guidelines for these parameters; therefore, they were carried forward for further assessment in the ERA. Since PAHs are known to have cumulative effects, all PAHs analysed for in soil were carried forward in the ERA for further assessment.

COPC Screening – Soil – Upper Site

As shown in Table I.2, Appendix I, the maximum concentrations of several metals (antimony, boron, cadmium, chromium, copper, lead, nickel, selenium, silver, tin, and zinc) and PHC F2, and PHC F3 in soil exceed the applicable screening guidelines. The EPCs for cadmium, chromium, copper, lead, nickel, and zinc also exceed the applicable screening guidelines as shown in Table I.1, Appendix I. Table 12.2 presents the maximum concentrations and the EPCs based on the screening process outlined above and shown in Table I.1, Appendix I.

Table 12.2 Maximum Concentrations and Recommended EPCs (Upper Site)

Chemical of Concern	Maximum (mg/kg)	EPC (mg/kg)	Screening Guideline	Recommended Best Fit
Petroleum Hydrocarbons				
PHC F1	3.4	3.4	210	Maximum
PHC F2	28,000	6835	150	97% KM (Chebyshev) UCL
PHC F3	30000	8965	300	97% KM (Chebyshev) UCL

Table 12.2 Maximum Concentrations and Recommended EPCs (Upper Site)

Chemical of Concern	Maximum (mg/kg)	EPC (mg/kg)	Screening Guideline	Recommended Best Fit
Metals				
Antimony	57	57	20	Maximum
Boron	190	190	1.5	Maximum
Cadmium	61	23	3.8	Gamma Adjusted KM - UCL
Chromium	190	83	64	95% Chebyshev (Mean, Standard Deviation) UCL
Copper	48000	16986	63	97% KM (Chebyshev) UCL
Lead	2100	585	70	95% Chebyshev (Mean, Standard Deviation) UCL
Nickel	510	163	45	95% KM (Chebyshev) UCL
Selenium	240	240	1	Maximum
Silver	150	150	20	Maximum
Tin	1500	1500	5	Maximum
Zinc	8000	2588	250	95% Chebyshev (Mean, Standard Deviation) UCL

PHC F2 and several metals (antimony, boron, cadmium, chromium, copper, lead, nickel, selenium, silver, tin, and zinc) were identified as COPCs in soil requiring further assessment in the ERA. Because of the cumulative effects of PHCs, all three fractions (PHC F1, F2, and F3) were carried forward for further assessment in the ERA. Concentrations of 2-methylnaphthalene were detected in soil samples from the Upper Site but there are no ecological screening guidelines for this parameter; therefore, it was carried forward for further assessment in the ERA. Since PAHs are known to have cumulative effects, all PAHs analysed for in soil were carried forward in the ERA for further assessment.

Note that no EPCs could be calculated for antimony, boron, selenium, silver, and tin at the Upper Site. In each case, there was only one of two localized exceedances of the screening guideline primarily in an area of metal debris. The maximum concentration was therefore carried forward in the ERA.

12.1.1.2 COPCs in Sediment

For the determination of ecological COPCs in sediment, maximum concentrations in sediment samples from Ashuapun Lake were compared to ecological health-based quality guidelines based on the following order:

- Atlantic Risk-Based Corrective Action (RBCA) Version 3.0, Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada; chronic narcosis-based sediment toxicity benchmarks
- CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (freshwater probable effects level) (PEL)
- Ontario Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: lowest effect level

Lower Site

The laboratory analytical results for sediment samples collected at the Lower Site are presented in Appendix G and the ecological screening of maximum chemical concentrations of COPCs from Ashuapun Lake is presented in Table I.3, Appendix I. Maximum concentrations of COPCs in sediment did not exceed the applicable screening guidelines. Therefore, no COPCs in sediment were carried forward for further assessment.

Upper Site

As discussed, with the exception of a small pool of standing water which is expected to dry up seasonally, no water bodies were observed at the Upper Site. Therefore, screening of COPCs in sediment at the Upper Site was not conducted.

12.1.1.3 COPCs in Surface Water

For the determination of COPCs in surface water, maximum concentrations in surface water from Ashuapun Lake were compared to the ecological health-based guidelines in the following order:

- Atlantic PIRI Tier I Surface Water Ecological Screening Levels for the Protection of Aquatic Life: Freshwater (BTEX and TPH)
- CCME Sediment Quality Guidelines for the Protection of (Freshwater) Aquatic Life (PAHs)
- Ontario Ministry of the Environment and Climate Change (MOECC) Aquatic Protection Values (APVs)

Lower Site

Concentrations of aluminium and iron in surface water from Ashuapun Lake exceeded the applicable ecological screening guidelines.

The concentration of iron in one surface water sample (2018-SW-9 – 380 mg/L) of nine collected from Ashuapun Lake exceeded the ecological screening guideline (300 mg/L). All other concentrations of iron detected in surface water were below the guidelines. The elevated concentration of iron in one surface water sample is expected to be localized and not considered a concern for aquatic life in Ashuapun Lake.

The concentration of aluminum in surface water samples exceeded the ecological screening guideline. Based on the measured hardness and pH of the surface water, the aluminium is likely naturally occurring and a result of groundwater influence.

The complete compilation of surface water data is presented in Appendix F. The screening table for COPCs in surface water from Ashuapun Lake is presented in Appendix I-3, Appendix I.

Upper Site

As discussed, with the exception of a small pool of standing water which is expected to dry up seasonally, no water bodies were observed at the Upper Site. Therefore, screening of COPCs in surface water at the Upper Site was not conducted.

12.1.1.4 Summary of Ecological COPCs

Based on the screening of maximum soil, sediment, and surface water concentrations against applicable ecological pathway-specific guidelines, the following COPCs were carried forward in the ERA at the Lower Site:

- petroleum hydrocarbons (PHC F1, F2, and F3) in soil
- PAHs in soil

Based on the screening of maximum soil concentrations against applicable ecological pathway-specific guidelines, the following COPCs were carried forward in the ERA at the Upper Site:

- petroleum hydrocarbons in soil
- PAHs in soil
- metals (antimony, boron, cadmium, chromium, copper, lead, nickel, selenium, silver, tin, and zinc) in soil

Note that surface water and sediment samples were collected from the pools of standing water located throughout the Lower Site. While these pools of water are not expected to contain fish, semi-aquatic ecological receptors such as mink and waterfowl may occasionally use these pools of standing water. Therefore, if a COPC was carried forward for soil, it was also carried forward in sediment and surface water for semi-aquatic receptors.

12.1.2 Identification of Ecological Receptors

For the purpose of ecological risk assessment, it is neither practical, nor necessary, to individually assess each wildlife species that may potentially occupy, visit or live near the Site. Instead, the potential for adverse effects is evaluated for a subset of wildlife receptors (referred to as Valued Ecological Components, or VECs) that may be exposed to COPCs at or near the Site. VECs are chosen by focusing on wildlife species that are:

- Indigenous to the area and would be potentially exposed to site contaminants
- Most likely to receive the greatest exposure to contaminants due to their habitat, behavioural traits, and home range
- Representative of various levels in the trophic web (e.g., carnivore, herbivore, insectivore)
- Potentially at risk because they have been classified as being rare or endangered (i.e., species of conservation concern)

Potential mammalian and avian receptor habitats and receptors were identified through a desktop review of information and previous reports for the site by a biologist from Stantec. This information is presented in Section 1.2.3 and was used to identify appropriate terrestrial ecological receptors that are likely exposed to COPCs at the site or that would serve as suitable surrogates for other species that are exposed to COPCs at the site.

The species selected as VECs for the site are summarized in Table 12.3. As discussed, aquatic habitat does not exist at the Upper Site; therefore, semi-aquatic receptors were not evaluated for the Upper Site.

Table 12.3 Summary of Valued Ecological Components

VEC Category	VEC	Scientific Name	Primary Diet Items
Semi-Aquatic VECs			
Birds	American robin	*Turdus migratorius*	• Terrestrial invertebrates
	Red-tailed Hawk	*Buteo jamaicensis*	• Small mammals
	Common Mergenser	*Mergus merganser*	• Fish
Mammals	Meadow vole	*Microtus pennsylvanicus*	• Terrestrial plants
	Masked shrew	*Sorex cinereus*	• Terrestrial invertebrates
	Mink	*Neovison vison*	• Terrestrial mammals and birds, freshwater fish

12.1.3 Qualitative Assessment of Effects to Plants and Invertebrates

As discussed in Section 1.2.3, the site and surrounding habitat types contain vegetation cover typical of alpine barrens and likely provide potential habitat for a variety of wildlife, including small mammals, and birds. A qualitative assessment indicated that vegetation on the site was comparable to other unimpacted areas near the site. Further, it is assumed that the presence of a healthy plant community is evidence for the likely presence of a healthy soil invertebrate community. Plants and soil invertebrate communities near the site appear functionally intact and other significant adverse effects to plant and soil invertebrate communities resulting from COPCs identified in soil are not anticipated.

12.1.4 Exposure Pathway Identification

A complete exposure pathway is one that meets the following four criteria (USEPA, 1989):

- a source of COPC must be present
- transport mechanisms and media must be available to move the chemicals from the source to the ecological receptors
- an opportunity must exist for the ecological receptors to contact the affected media
- a means must exist by which the chemical is taken up by ecological receptors, such as direct contact, ingestion or inhalation

The relevant exposure pathways are summarized in Table 12.4, which includes a qualitative evaluation of each pathway and a discussion about whether the pathways are complete. Those complete hazard-exposure-receptor combinations considered to have the highest likelihood to contribute to an ecological health risk were carried forward in the quantitative ERA.

Table 12.4 Potential Exposure Scenarios – Terrestrial Receptors

Exposure Pathway Description	Complete Pathway?	Carried Forward for Analysis?	Justification
Ingestion of soil	Yes	Yes	COPCs are present in surface soils at the site. Although terrestrial receptors may come into contact with chemicals identified in surface soil, direct dermal contact is considered unlikely due to the presence of fur or feathers. However, ecological receptors may ingest soil through grooming or other related behaviors. As such, the ingestion of soil containing COPCs was considered further in this ERA.
Dermal contact with soil			
Ingestion of terrestrial invertebrates, vegetation, or small animal prey living at the site and exposed to contaminated soil	Yes	Yes	Terrestrial receptors on the site may ingest terrestrial invertebrates and terrestrial vegetation that are living at the site and have been exposed to the impacts in surface soil. Some receptors prey on small animals.
Ingestion of surface water	Yes	Yes	Lower Site: Uptake from ingestion of water as a result of feeding, drinking, or grooming is a potential source of exposure to semi-aquatic receptors. Upper Site: No aquatic habitat exists at the Upper Site. This exposure pathway was not considered further for the Upper Site.
Ingestion of sediment	Yes	Yes	Lower Site: Uptake from incidental ingestion of sediment is a potential source of exposure to semi-aquatic receptors. Upper Site: No aquatic habitat exists at the Upper Site. This exposure pathway was not considered further for the Upper Site.
Aquatic biota ingestion	Yes	Yes	Lower Site: The consumption of contaminated biota such as freshwater aquatic plants, invertebrates, and fish can provide a source of exposure to semi-aquatic receptors depending on environmental fate and transport properties of COPCs. Ashuapun Lake was the only identified fish habitat at the Lower Site. Since COPCs carried forward for soil (i.e., PHC, PAHs) were not detected in sediment or surface water from the Lake, the fish ingestion exposure pathway, however, was not assessed further. Further, concentrations of all chemicals in sediment and surface water were below the screening guidelines. Upper Site: No aquatic habitat exists at the Upper Site. This exposure pathway was not considered further for the Upper Site.
Water Dermal Absorption/Contact	No	No	Dermal absorption of COPCs is not expected to provide a relevant source of exposure to semi-aquatic receptors when compared to direct/indirect ingestion of water.

12.1.5 Ecological Conceptual Site Model

Based on the qualitative risk evaluation, the conceptual model developed for screening ecological receptors is:

- Terrestrial and semi-aquatic ecological receptors may ingest COPCs identified in surface soil, surface water, and/or sediment at the site.
- Terrestrial and semi-aquatic ecological receptors may ingest terrestrial and aquatic invertebrates, terrestrial and aquatic vegetation, and/or terrestrial small animals that have accumulated COPCs identified at the site.

12.2 Exposure Assessment

12.2.1 Calculation of Exposure Point Concentrations

As discussed, an exposure point concentration (EPC) is used to represent the concentration of a chemical within each applicable medium (e.g., soil, food item) to which an ecological receptor is assumed to be exposed during their time at a site.

For exposure media that were directly measured during the site characterization activities (e.g., surface water and sediment), the EPC was represented by a statistic derived from Site data. Where sufficient sample size permitted (i.e., n ≥ 10), the 95% upper confidence limit of the mean (UCLM) was used to represent a conservative but reasonable upper limit of the EPC. Compared to the maximum value, the 95% UCLM is a better measure of the exposure an organism may experience while moving around the Site, as well as what a community of sessile organisms may experience. All 95% UCLMs were calculated using USEPA's ProUCL Version 5.1 statistical software. If more than one 95% UCLM value was recommended by ProUCL, the most conservative value was selected. ProUCL outputs are provided in Appendix I.

For those COPCs with insufficient sample size to calculate the 95% UCLM (i.e., n < 10), or those with too few detectable concentrations for ProUCL to calculate a 95% UCLM, the maximum value was conservatively selected as the EPC. If all values were below the detection limit, half the detection limit was selected as the EPC.

For receptors such as semi-aquatic birds and mammals, which are associated with multiple exposure pathways, COPCs identified in one medium (e.g., sediment) are also considered in other applicable media (e.g., surface water), even if concentrations were below ecological guidelines or detection limits.

EPCs for media not directly measured (i.e., food items such as aquatic vegetation and benthic invertebrates) are estimated for each COPC with the use of compound-specific uptake factors (UFs), which account for biomagnification.

The generalized equation used to calculate a COPC concentration in biotic tissue from a media concentration is as follows:

$$EPC_i = EPC_{media} \times UF_i$$

where:

EPC_i = Exposure point concentration in target biotic tissue i (mg/kg wet weight)
EPCmedia = Exposure point concentration in media (mg/kg dry weight or mg/L)
UFi = Uptake factor from soil-to-wet weight target biotic tissue i (dimensionless)

EPCs and uptake factors are presented in Appendix I.

12.2.1.1 Calculation of Average Daily Dose

To accommodate the multiple and varying exposure pathways experienced by birds and mammals, it is necessary to estimate the rate of exposure to a COPC on a mg/kg/day basis (referred to as the average daily dose, or ADD). For each VEC, the ADD is calculated for each COPC by considering the intake from each applicable exposure pathway (e.g., food ingestion). The generalized form for the ADD calculation is as follows:

$$ADD_j = IF_j \times AF_j \times EPC_j$$

where:

ADD_j = Average daily dose (mg chemical/kg body weight-day)
IF_j = Intake factor (kg contaminated media/kg body weight-day)
AF_j = Absorption factor (default value of 1, unless otherwise specified)
EPC_j = Exposure point concentration (mg chemical/kg media)

The intake factor is not specific to each COPC, but is dependent on the exposure media. It is calculated for each exposure pathway using the media-specific ingestion rate (IR), the fraction of the total ingestion rate from the Site (f_{Site}) and the receptor's body weight (BW) as follows:

$$IF_j = (IR_j \times f_{Site}) / BW$$

where:

IF_j = Intake factor (kg contaminated media/kg body weight-day)
IR_j = Ingestion rate (kg contaminated media/ day)
f_{site} = Fraction of total ingestion rate from the Site (unitless)
BW = Receptor body weight (kg)

The ADD is also adjusted for the predicted residency time of each semi-aquatic bird and mammal. Ecological receptors such as red-tailed hawk, common merganser, and mink have feeding ranges larger than the area of the Sites, (i.e., which is conservatively assumed to be 200 ha for the Lower Site and 3 ha for the Upper Site) and are therefore expected to spend some time onsite but the remainder offsite. The

amount of time that a VEC is onsite and thus potentially exposed to COPCs (f_{Site}) is assumed to be proportional to the ratio of the Site area divided by the area of the VEC's feeding range.

Ecological receptors with home ranges less than the area of the Site (i.e., meadow vole, masked shrew, American robin) are assumed to be present 100% of the time. To be conservative, a residency time of 100% was assumed for each ecological receptor assessed.

12.2.2 Hazard Assessment

The objective of the Toxicity Assessment was to derive exposure limits or toxicological reference values (TRVs) that are protective of the selected VECs with regards to the assessment endpoints. A toxicity assessment is the basis for evaluating what might be an acceptable exposure level and what concentration may result in adverse environmental effects from chronic exposure to COPCs.

12.2.3 Terrestrial and Semi-Aquatic Avian and Mammalian Populations

The avian and mammalian TRVs for the ERA are based on dose-response studies, typically conducted with laboratory animals where the lowest observed adverse effects level (LOAEL) or no observed adverse effects level (NOAEL) were quantified. In the absence of a suitable LOAEL, NOAEL-based TRVs are used. Generally, LOAELs used towards TRV derivation are based on long-term growth or survival, or sub-lethal reproductive effects determined from chronic exposure studies. As such, these endpoints are relevant to the maintenance of wildlife populations, and population health, which is consistent with the assessment endpoint of the ERA.

Numerous sources were reviewed to obtain the most relevant TRVs for ecological receptors. Information sources included, but were not limited to:

- CCME Environmental Quality Guidelines supporting documentation (1996 to 2015)
- Oak Ridge National Laboratory Toxicity Benchmarks for Wildlife (Sample et al., 1996)
- USEPA Ecological Soil Screening documents (1996 to 2013)
- Ontario MOECC (MOECC, 2011)
- Primary scientific literature

The TRVs selected for mammals and birds are presented in Appendix I.

12.3 Risk Characterization

The Risk Characterization evaluates the evidence linking COPCs with adverse ecological effects by combining information from the Exposure and Toxicity Assessments. This is performed for the assessment endpoint:

- Viability and health of local avian and mammalian populations

The potential for adverse effects to birds and mammals is quantified by comparing the amount of a substance that can be tolerated, below which adverse environmental effects are not expected (e.g., TRV), to the amount of a COPC an organism is expected to be exposed to, or come into contact with, on a daily

basis. The ratio of the exposure level, or average daily dose (ADD), to the exposure limit (TRV) is referred to as the Hazard Quotient (HQ):

$$HQ = \text{ADD (mg/kg-d)} / \text{TRV}$$

The magnitude by which values differ from parity (e.g., TRV = daily dose, HQ = 1.0) is used to make inferences about the possibility of ecological risks.

A HQ less than 1.0 indicates that the exposure concentration is less than the threshold of toxicity and there is a low probability that adverse environmental effects might occur. Given the inherent conservatism of the risk assessment approach, there is a high degree of certainty associated with this conclusion. However, a HQ greater than 1.0 does not automatically indicate that adverse ecological effects are occurring. In contrast to low HQ values, the conservative approach imparts a low degree of certainty for these conclusions and HQ values greater than 1.0 should be examined carefully. Additional investigations and assessment of multiple lines of evidence often serve to reduce conservatism and provide a more accurate assessment of the actual level of risk.

12.3.1.1 Risk Characterization for Terrestrial Ecological Receptors

In this section, results of the quantitative evaluation of avian and mammalian receptors are presented. A summary of the HQs calculated for each terrestrial and semi-aquatic bird and mammal VEC is presented in Tables 12.5 (Lower Site) and Table 12.6 (Upper Site).

Lower Site

Table 12.5 presents total HQs for terrestrial and semi-aquatic avian and mammalian receptors for the Lower Site. The contribution of each exposure pathway to the total HQ is provided in Appendix I.

Table 12.5 Hazard Quotients for Ecological Receptors (Lower Site)

COPC	Total Hazard Quotient					
	Meadow Vole	**Masked Shrew**	**Mink**	**Red-tailed Hawk**	**Common merganser**	**American robin**
PAHs	0.00058	0.00084	0.0033	NC	NC	NC
Modified TPH	0.33	0.49	0.0094	0.047	0.0029	**3.6**

Notes:
Bold = HQ>1
NC = For PAHs and antimony, there is insufficient data to define TRVs for avian receptors. However, available evidence (Kapustka, 2004) suggests that mammals are generally more sensitive to PAHs than birds, so if small mammals are protected, birds should also be adequately protected.

As presented in Table 12.5, with the exception of the American robin, the total hazard quotients are less than 1 for each ecological receptor assessed. Therefore, unacceptable risks to meadow vole, masked shrew, mink, red-tailed haw, common merganser and those receptors they represent at this site are considered unlikely.

For the American robin, the intake pathways include soil ingestion, terrestrial plant ingestion, and terrestrial invertebrate ingestion. Most of the diet of the American robin is derived approximately equally from terrestrial invertebrates and plants (see Intake Parameter tables in Appendix I). Based on site characteristics, the American robin are assumed to potentially nest near the site, deriving their dietary requirements (including the dietary requirements of its chicks from egg-laying to fledging) from the site.

HQ values for TPH are directly linked to the predicted concentration in earthworms and plants. While the empirical uptake factors used are considered to be robust and unbiased, they are also driven by the soil EPC values for TPH. As noted, the site assessment process generates positively biased data, and the EPC value itself is an intentionally conservative estimator of the site mean value, particularly for this site as the maximum was used. Therefore, the estimated TPH concentrations in plant and earthworm tissues are biased high because of the soil EPC value.

Earthworms represent only a single component of the soil invertebrate community, which also includes a wide variety of other forms including: insects, other arthropods, and mollusks (slugs and snails). Importantly, where different components of the soil invertebrate community have been tested, earthworms typically have much higher concentrations than mollusks, which in turn have higher concentrations than insects and other arthropods. Therefore, where wildlife species such as the American robin are feeding on a mixed diet of soil invertebrates (not exclusively earthworms, but primarily insects), their actual dietary exposure would be much less than that predicted assuming a diet of 100% earthworms. In addition, TPH are not expected to accumulate in insects and mammals (CCME, 2008).

In consideration of this, it is unlikely that the moderate modified TPH HQ value of 3.6 for American robin indicates harmful effects to this bird or other birds it represents at this site

Upper Site

Table 12.6 presents total HQs for terrestrial avian and mammalian receptors for the Upper Site. The contribution of each exposure pathway to the total HQ is provided in Appendix I.

Table 12.6 Hazard Quotients for Ecological Receptors (Upper Site)

COPC	Total Hazard Quotient			
	Meadow Vole	Masked Shrew	Red-tailed Hawk	A. Robin
Antimony	0.92	**9.9**	NC	NC
Boron	0.25	0.071	0.052	**1.2**
Cadmium	0.21	**5.2**	0.12	**4.5**
Chromium	0.32	**1.3**	0.14	0.86
Copper	**44**	**6.5**	0.10	**8.2**
Lead	0.12	0.44	0.12	**1.2**
Nickel	**1.9**	**22**	0.084	**1.8**
Selenium	**31**	**75**	**4.7**	**90**
Silver	0.079	2.5	0.062	**9**

Table 12.6 Hazard Quotients for Ecological Receptors (Upper Site)

COPC	Total Hazard Quotient			
	Meadow Vole	**Masked Shrew**	**Red-tailed Hawk**	**A. Robin**
Tin	0.29	0.93	NC	NC
Zinc	0.46	**1.7**	0.11	**1.2**
PAHs	0.00043	0.00052	NC	NC
Modified TPH	**2.1**	**3.8**	0.35	**24**

Notes:
Bold = HQ>1
NC = For PAHs and antimony, there is insufficient data to define TRVs for avian receptors. However, available evidence (Kapustka, 2004) suggests that mammals are generally more sensitive to PAHs than birds, so if small mammals are protected, birds should also be adequately protected.

As presented in Table 12.6 the total hazard quotient for meadow voles exposed to copper, nickel, selenium, and TPH, for masked shrew exposed to antimony, cadmium, chromium, copper, nickel, selenium, zinc, and TPH, for red-tailed hawk exposed to selenium, for American robin exposed to boron, cadmium, copper, lead nickel, selenium, silver, zinc, and TPH exceed the target of 1.0.

As discussed in Section 12.1.1.1, the metals impacts are localized and there was insufficient data to calculate EPCs for several metals (e.g., antimony, boron, selenium, silver, tin, and zinc). There is metal debris located in the area of the Upper Site where elevated concentrations of several metals were detected (i.e., in the area of samples BB-SS44, BB-SS48, BB-TP41, 2018-SS46, and 2018-SS-47). The area of petroleum hydrocarbon impacts is also localised. Recommendations regarding the removal of metal debris and metals and petroleum hydrocarbon impacted surface soil are provided in Section 14.0.

13.0 NCSCS SITE CLASSIFICATION SUMMARY

The detailed evaluation form obtained from the National Classification System for Contaminated Sites (NCSCS) was developed by CCME, March 1992 (updated 2008, 2010 v1.3) to provide a nationally consistent ranking of sites in terms of potential remediation requirements. The evaluation process generally considers contaminant sources, exposure pathways, and potential human and environmental receptors, but is not intended to be used as a risk assessment tool. The scoring system reflects the concentrations and potential exposures of contaminants in relation to generic CCME remediation criteria. NCSCS site scores are categorized as shown in Table 13.1.

Table 13.1 NCSCS Scoring Summary (CCME, 2008, v1.3)

Total Score	Class	Priority for Action
>70	Class 1	High
50-69.9	Class 2	Medium
37-49.9	Class 3	Low
<37	Class N	Not a priority
>15% of Responses are “Do not know”	Class INS	Insufficient Information

The Upper Site and Lower Site obtained NCSCS scores of 61.7 and 66.1 respectively. Based on these scores, the Upper Site and Lower Site are both classified as Class 2, indicating a medium priority for action. The detailed NCSCS evaluation form is presented in Appendix H.

14.0 CONCLUSIONS AND RECOMMENDATIONS

The findings and results of the Phase III ESA and HHERA are summarized as follows:

Phase III ESA

1. The stratigraphy at the Upper Site consists generally of a silty sand till veneer with frequent cobbles and boulders directly overlying bedrock. The Lower Site is comprised of a glacial esker and was levelled off to form the gravel runway. The stratigraphy at the Lower Site consists generally of reworked sand and gravel likely disturbed during the construction of the airstrip. The current investigation indicate that this layer is generally underlain by thick stratified deposits of dense, light brown to grey, fine to medium grained glacio-fluvial silty sand with silt lensing. Bedrock was not encountered in boreholes at the Lower Site during the current investigation. However, discontinuous permafrost was encountered in several boreholes.
2. Concentrations of TPH in select soil, sediment, surface water, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

    a. Petroleum hydrocarbon impacts were identified in soil in exceedance of the applicable RBCA Tier I RBSLs and/or Tier I ESLs for a commercial site with coarse grained soil, non-potable water and either gasoline/fuel oil/lube oil impacts at the Camp / Antenna Areas and AES Compound (13,745 m^3), Waste Disposal Sites (78 m^3), and Upper Site (59 m^3).
    b. Petroleum hydrocarbon impacts were identified in freshwater sediment in exceedance of the applicable RBCA Tier I Sediment ESLs for the Protection of Freshwater and Marine Aquatic Life (Typical sediment) at the Waste Disposal Sites (23 m^3), Former Innu Camp (12 m^3), and Upper Site (5 m^3).
    c. Petroleum hydrocarbon impacts were identified in surface water in exceedance of the applicable RBCA Tier I ESLs (freshwater and marine aquatic life) for fuel oil/lube oil impacts at the Waste Disposal Sites, but the areal extent of impacts was not assessed as part of the current investigation.
    d. Petroleum hydrocarbon impacts were identified in groundwater in exceedance of the applicable RBCA Tier I RBSLs and/or Tier I ESLs for a commercial site with coarse grained soil, non-potable water and either gasoline/fuel oil/lube oil impacts at the Camp / Antenna Areas and AES Compound (3,359 m^2) and the Waste Disposal Sites (313 m^2).

3. Concentrations of PAHs in select soil, sediment, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

    a. PAH impacts were identified in soil in exceedance of the applicable CCME SQGs for the Protection of Environmental and Human Health for Commercial land use at the Camp / Antenna Areas and AES Compound (1,742 m^3) and the Waste Disposal Sites (78 m^3).
    b. PAH impacts were identified in freshwater sediment in exceedance of the applicable CCME PEL for Freshwater Sediment at the Upper Site (5 m^3).
    c. PAH impacts were identified in groundwater in exceedance of the applicable AENV Groundwater Remediation Guideline values for commercial/industrial land use and non-potable groundwater at the Camp / Antenna Areas and AES Compound (3,359 m^2) and the Waste Disposal Sites (313 m^2).

4. Concentrations of Metals in select soil, surface water, and groundwater samples exceeded the applicable generic regulatory guidelines and may present risks to human or ecological health on the Site, as follows:

    a. Metals impacts were identified in surface soil in exceedance of the applicable CCME SQGs for the Protection of Environmental and Human Health for Commercial land use at the Camp / Antenna Areas and AES Compound (100 m^3) and the Upper Site (143 m^3).
    b. Metals impacts were identified in surface water in exceedance of the applicable CCME WQG for the protection of Freshwater Aquatic Life in the Lower Site – General Area, the Camp / Antenna Areas and AES Compound, the Unknown Foundation / Building, the Waste Disposal Sites, the Former Innu Camp, the General Dump Site, and the Upper Site, but the areal extent of impacts was not assessed as part of the current investigation.

5. Concentrations of PCBs in one groundwater sample exceeded the applicable MOE Groundwater Standards for a Generic Site with non-potable groundwater at the Camp / Antenna Areas and AES Compound (313 m^2). It is suspected that the exceedance of PCBs in groundwater sample 2018-MW09 is likely associated with suspended solids due to low-level detected PCB concentrations in soil in the area based on sample BB-TP26-BS1 collected during the Phase II ESA.
6. The measured pH value of 2.75 in sample 2018-MW11 at the Camp / Antenna Areas and AES Compound is suspected to be the result of preservative cross-contamination during sample collection.
7. A total of approximately 5,000 L of product was recovered and incinerated and an additional 3,400 L of oily water was processed with the oil water separator.
8. The Upper Site and Lower Site obtained NCSCS scores of 61.7 and 66.1 respectively. Based on these scores, the Upper Site and Lower Site are both classified as Class 2, indicating a medium priority for action.

HHERA

1. Because of the rough terrain, limitations to access, and remote nature of the Upper Site, human exposure is possible but would be considered negligible. The Upper site was therefore not considered further in the human health risk assessment.
2. Based on the screening of chemicals, no COPCS were carried forward for further evaluation in the HHRA. Therefore, potential adverse effects are not expected to human receptors at the Lower Site under current conditions.
3. Substantive site-related health risks to terrestrial and semi-aquatic ecological receptors, including plant and soil invertebrate communities, mammals, and birds, were not identified at the Lower Site.
4. Potentially unacceptable risks were identified for birds and mammals exposed to metals and petroleum hydrocarbons at the Upper Site. The metals impacts at the Upper Site are localized in the area of soil samples 2018-SS47, 2018-SS46, BB-SS41, BB-TP44, and BB-SS48 where metal debris from the former infrastructure was observed. TPH impacts are localized near the former antenna tower in the area of soil samples 2018-SS35 and BB-SS46.

Recommendations

1. It is recommended that liquid PHC product remaining in drums at the Site is removed and incinerated, and empty drums, including the ones stockpiled as part of the current investigation, are crushed and buried in the Drum Disposal Area (Site #1 of the Waste Disposal Sites).
2. It is recommended that two groundwater samples are collected from 2018-MW09 at the Camp / Antenna Areas and AES Compound for analysis of PCBs and Total Suspended Solids (TSS); one

sample should be unfiltered, and one field filtered to determine the source of PCBs identified during the current investigation.

3. It is recommended that groundwater at 2018-MW11 at the Camp / Antenna Areas and AES Compound is re-sampled for pH to confirm the value measured from the Phase III ESA.
4. The HHRA was based on the current land use, non-potable groundwater use, and no occupied buildings (current or planned) within 5 m of the impacts. If land use changes or if development takes place on the site, the HHRA may require re-evaluation.
5. It is recommended that metals debris located on the Lower Site and the Upper Site, including debris present in the pools of standing water on the Lower Site, be removed.
6. It is recommended that surface soil in the area of the metals debris at the Upper Site be removed (i.e., in the area of samples 2018-SS47, 2018-SS46, BB-SS41, BB-TP44, and BB-SS48) and confirmatory soil samples be collected.
7. It is recommended that the analytical results from the Upper Site be incorporated into a re-evaluation of the ERA for the Upper Site.

15.0 CLOSURE

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report, and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities, or claims, howsoever arising, from third party use of this report.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

The conclusions are based on the site conditions encountered by Stantec at the time the work was performed at the specific testing and/or sampling locations, and conditions may vary among sampling locations. Factors such as areas of potential concern identified in previous studies, site conditions (*e.g.*, utilities) and cost may have constrained the sampling locations used in this assessment. In addition, analysis has been carried out for only a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Stantec does not warrant against undiscovered environmental liabilities nor that the sampling results are indicative of the condition of the entire site. As the purpose of this report is to identify site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the Site is beyond the scope of this assessment.

Closure
May 7, 2019

Should additional information become available which differs significantly from our understanding of conditions presented in this report, Stantec specifically disclaims any responsibility to update the conclusions in this report.

This report was prepared by Aaron Power, EIT., Paula Brennan, M.A.Sc., P.Eng., and Kelly Johnson, Ph.D. and reviewed by Jim Slade, P.Eng., P.Geo, Tania Noble, M.Sc., P.Eng., and Robert Macleod, M.Sc., P.Geo.

Respectfully submitted,

STANTEC CONSULTING LTD.

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APPENDIX A

Drawings

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT: NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT	SCALE: 1:5,000,000	DATE: SEPT. 6, 2018	REV. No. 0
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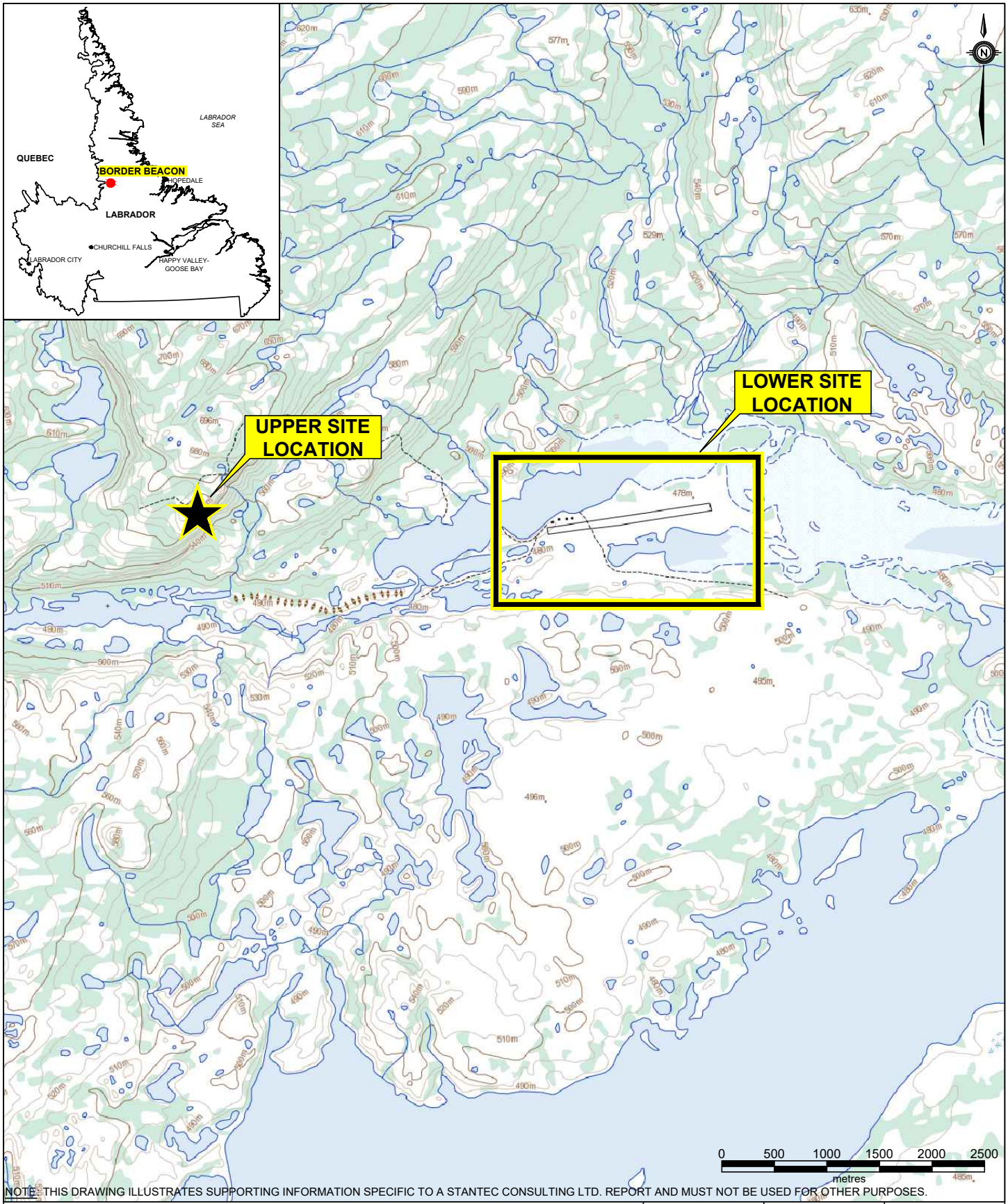
PROJECT TITLE: PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL	DRAWING No: 121414998-EE-01	CAD FILE: 121414998-EE-01.DWG	
DRAWING TITLE: SITE LOCATION PLAN	Stantec		

06SEP18 9:00AM



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PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SITE LOCATION PLAN - BORDER BEACON

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DRAWN BY:	EDITED BY:	CHECKED BY:
N.M.	-	J.S.
DRAWING No:	CAD FILE:	
121414998-EE-02	121414998-EE-02.DWG	

Stantec

06SEP18 9:00AM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- SEDIMENT SAMPLE (STANTEC 2017)
- SURFACE WATER SAMPLE (STANTEC 2017)
- VEGETATION / BERRY SAMPLE (STANTEC 2017)
- METALS EXCEEDANCE IN SURFACE WATER
- 1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)
- ASSUMED DIRECTION OF GROUNDWATER FLOW

ASHUAPUN LAKE

BB-SED2 BB-SW2

BB-SED1 BB-SW1

BB-SS8

BB-VEG1

BB-SS10

1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

CAMP / ANTENNA AREAS AND AES COMPOUND
SEE DRAWING No. 121414998-EE-04/EE-05

BB-SS3

2018-VEG08

2018-MW47

BB-SS7

GRAVEL AIR STRIP

BB-TP49

2018-MW48

BB-SS9

443.00

444.5

BB-SS4

BB-SS1

BB-SS2

BB-SS5

BB-SS6

BB-TP1

APPROXIMATE LOCATION OF ABANDONED 3,540L TANK

2018-SED06 2018-SW06

UNKNOWN FOUNDATION / BUILDING
SEE DRAWING No. 121414998-EE-06

WASTE DISPOSAL SITES
SEE DRAWING No. 121414998-EE-07/EE-08

FORMER INNU CAMP
SEE DRAWING No. 121414998-EE-09

446.00 447.00 448.00 447.5 447.00 446.5 446.00 445.5 446.5 445.5

GENERAL DUMP SITE
SEE DRAWING No. 121414998-EE-010

444.5

ASHUAPUN LAKE

0 50 100 150 200 250
metres

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PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - LOWER SITE - GENERAL AREA

SCALE:	DATE:	REV. No.
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DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
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PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER) PLAN - CAMP / ANTENNA AREAS AND AES COMPOUND

SCALE:	DATE:	REV. No.
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DRAWING No: 121414998-EE-04	CAD FILE: 121414998-EE-04.DWG	

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12APR19 2:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- PHC EXCEEDANCE IN GROUNDWATER
- PAH EXCEEDANCE IN GROUNDWATER
- METALS EXCEEDANCE IN GROUNDWATER
- PCB EXCEEDANCE IN GROUNDWATER
- 1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

2018-SED08 2018-SW08
ASHUAPUN LAKE
2018-SED09 2018-SW09
2018-SW07 2018-SED07
2018-VEG02
2018-VEG01
2018-MW53 2018-MW51 2018-MW52 2018-MW17 2018-MW50 2018-MW18 2018-MW26 2018-MW27 2018-MW32 2018-MW21 2018-MW20 2018-MW31 2018-MW09 2018-MW11 2018-MW05 2018-MW06 2018-MW08 2018-MW01
2018-BH19 2018-BH16 2018-BH14 2018-BH15 2018-BH25 2018-BH24 2018-BH23 2018-BH28 2018-BH22 2018-BH30 2018-BH29 2018-BH13 2018-BH12 2018-BH10 2018-BH04 2018-BH07 2018-BH03
2018-SS12 2018-SS13 2018-SS18 2018-SS14 2018-SS16 2018-SS17 2018-SS15 2018-SS10 2018-SS11 2018-SS09 2018-SS06 2018-SS07 2018-SS08 2018-SS03 2018-SS04 2018-SS05 2018-SS02 2018-SS01
BB-TP18 BB-TP20 BB-TP21 BB-TP19 BB-TP17 BB-TP22 BB-TP23 BB-TP24 BB-TP25 BB-TP26 BB-TP27 BB-TP28 BB-TP30 BB-TP31 BB-TP32 BB-TP33 BB-TP34 BB-TP35
BB-SS24 BB-SS25 BB-SS26 BB-SS27 BB-SS28 BB-SS29 BB-SS30 BB-SS31 BB-SS32 BB-SS33 BB-SS34 BB-SS35 BB-SS36 BB-SS37 BB-SS38 BB-SS40
2018-SS49

SHED
CELLULAR
DYKED 113,516L TANK
DRUMS
TEN 4,500L ASTs
FORMER 900L AST
ANTENNA (OIL FILLED)
FORMER CAMP BUILDING #3
FORMER 4,546L AST
FORMER ABOVE GROUND SEPTIC TANK
FORMER ANTENNA
FORMER ANTENNA
FORMER ANTENNA
FORMER CAMP BUILDING #4 (APPROXIMATE LOCATION)
AES BUILDING #1 STORAGE
AES BUILDING #2 EQUIPMENT
CAMP GARAGE BUILDING #2
TWO 4,500L ASTs
TANK CRADLE
CAMP FUEL SHED BUILDING #1
FORMER RE-FUELING AREA
FORMER DRUM STORAGE AREA
FORMER LOCATION OF LEAKING DRUMS
1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

0 10 20 30 40 50
metres

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

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PROJECT TITLE: PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE: SAMPLING AND EXCEEDANCE (GROUNDWATER) PLAN - CAMP / ANTENNA AREAS AND AES COMPOUND

SCALE:	DATE:	REV. No.
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DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-05	CAD FILE: 121414998-EE-05.DWG	

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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - UNKNOWN FOUNDATION / FORMER BUILDING

SCALE:	DATE:	REV. No.
1:1250	OCT. 09, 2018	0
DRAWN BY: N.M.	EDITED BY: S.A.	CHECKED BY:
DRAWING No: 121414998-EE-06	CAD FILE: 121414998-EE-06.DWG	

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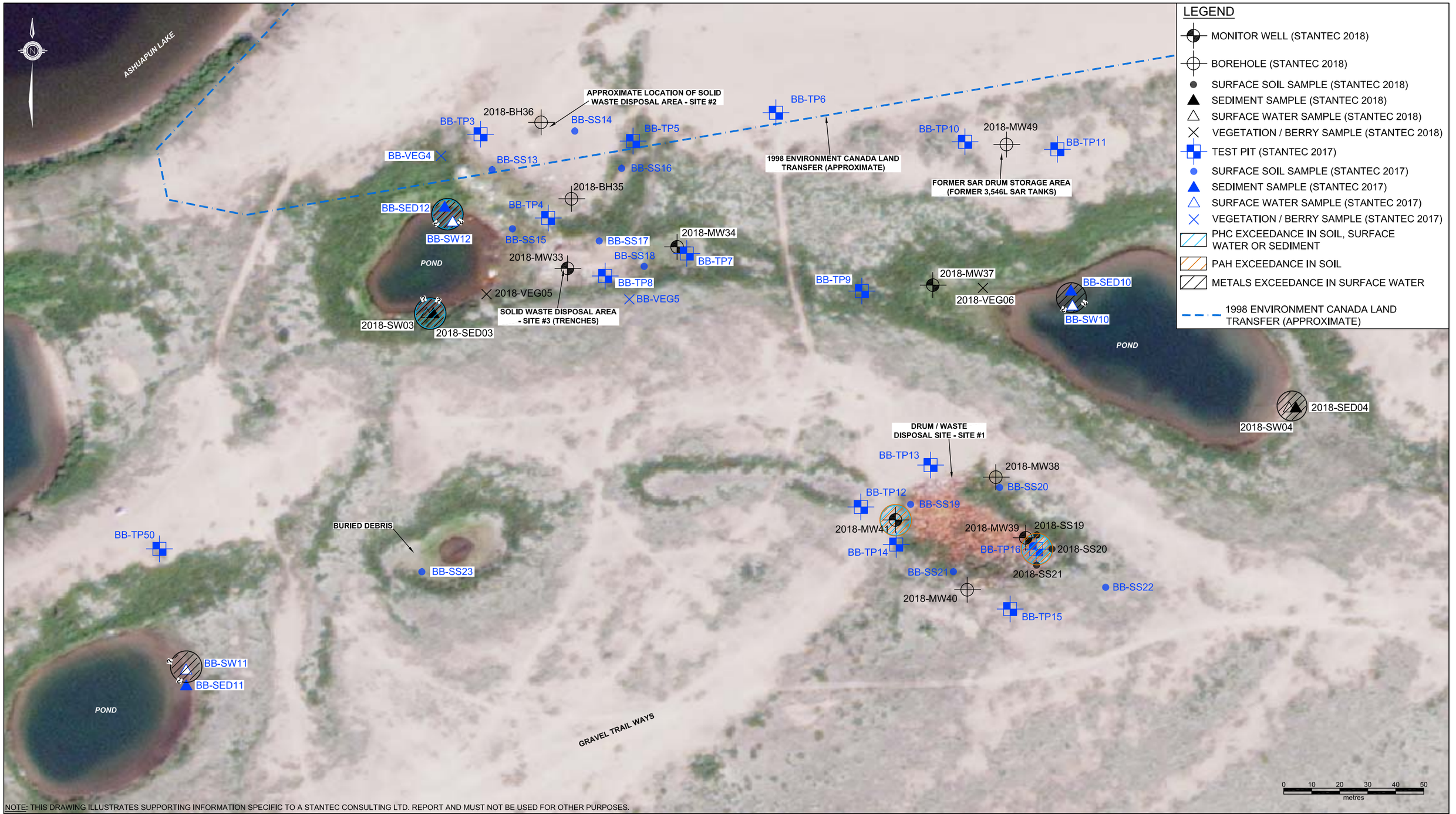
04SEP18 10:00AM



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NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

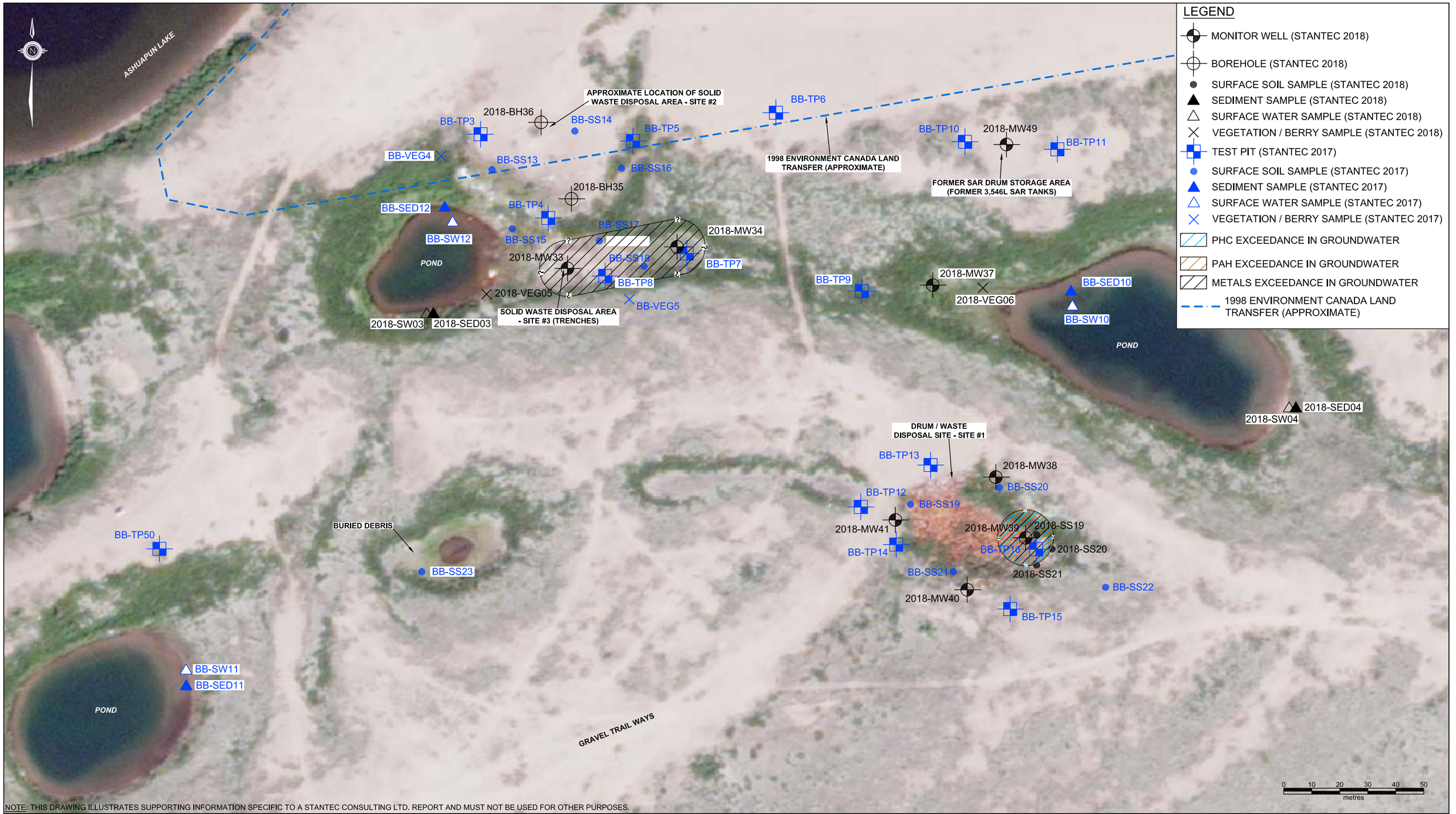
PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER, AND SEDIMENT) PLAN - WASTE DISPOSAL SITES

SCALE:	DATE:	REV. No.
1:1250	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-07	CAD FILE: 121414998-07.DWG	

Stantec

12APR19 2:00PM



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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (GROUNDWATER) PLAN - WASTE DISPOSAL SITES

SCALE:	DATE:	REV. No.
1:1250	APR. 12 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-08	CAD FILE: 121414998-08.DWG	

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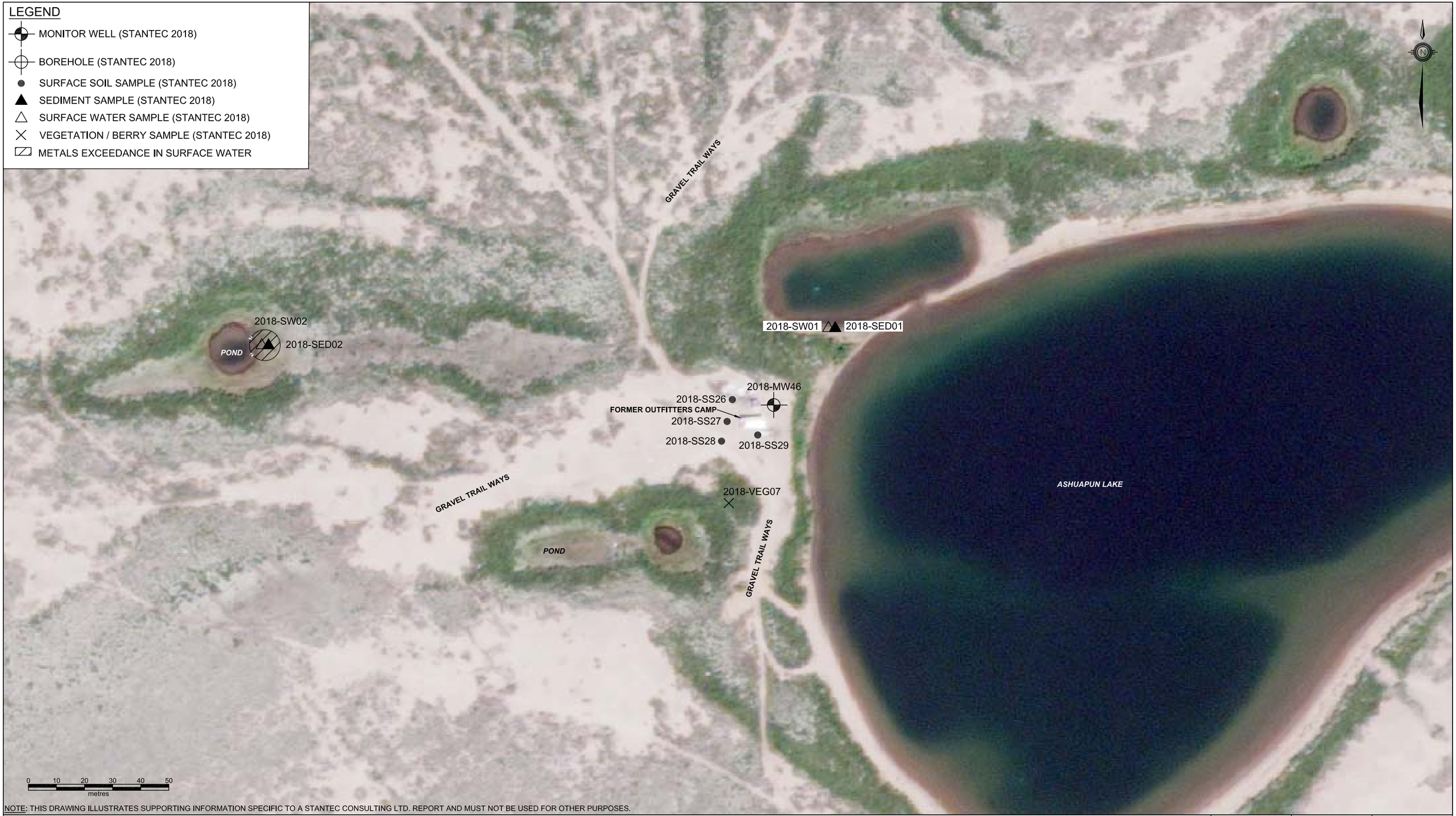
12APR19 2:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- METALS EXCEEDANCE IN SURFACE WATER



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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - FORMER INNU CAMP

SCALE:	DATE:	REV. No.
1:1250	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-09	CAD FILE: 121414998-EE-09.DWG	

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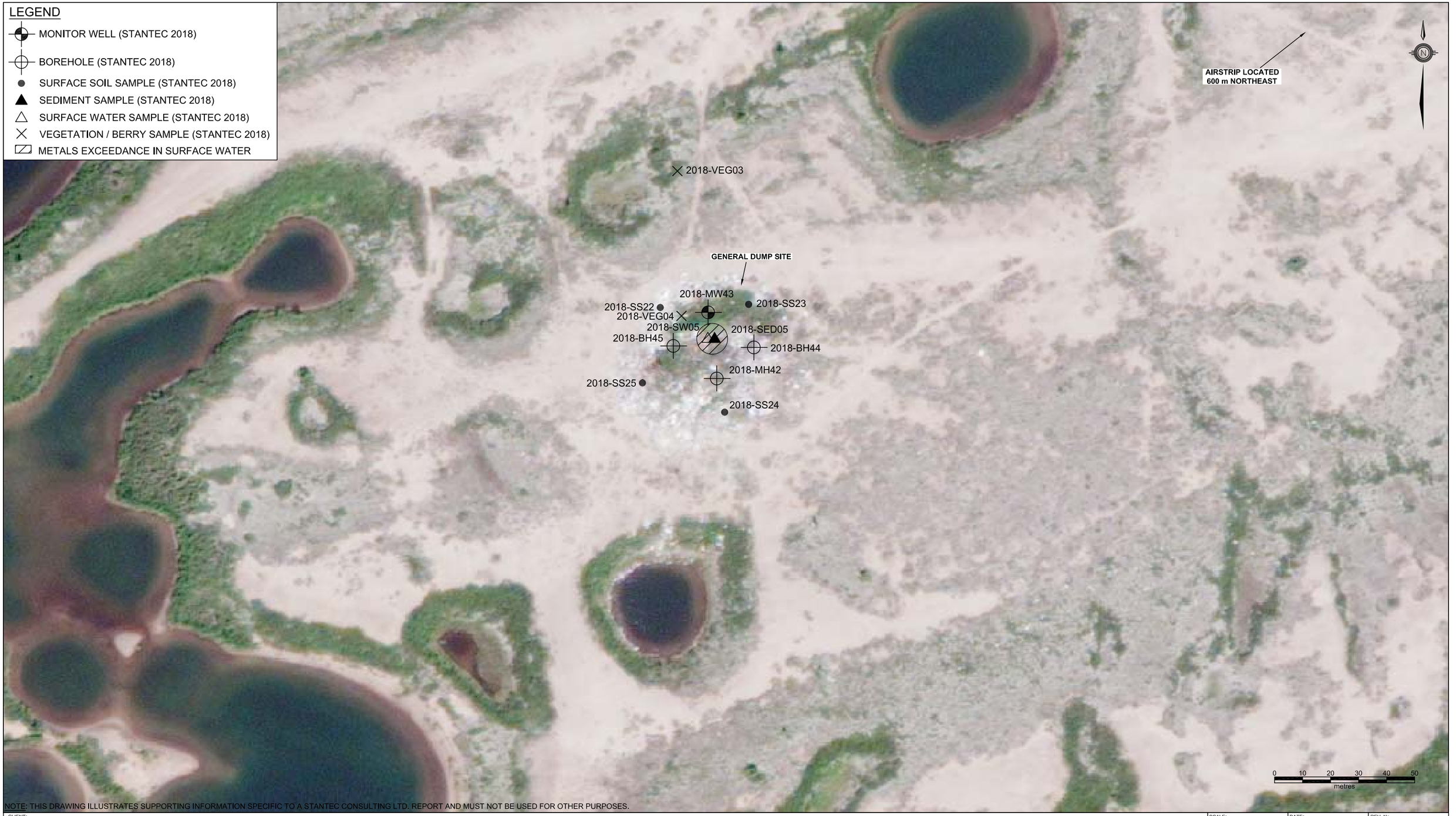
12APR19 02:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- METALS EXCEEDANCE IN SURFACE WATER



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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - GENERAL DUMP SITE

SCALE:	DATE:	REV. No.
1:1250	OCT. 09, 2018	0
DRAWN BY:	EDITED BY:	CHECKED BY:
C.F.	S.A.	J.S.
DRAWING No:	CAD FILE:	
121414998-EE-10	121414998-EE-10.DWG	

Stantec

12SEP18 10:00AM

LEGEND

- SURFACE SOIL SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- VEGETATION / BERRY SAMPLE (STANTEC 2017)
- SEDIMENT SAMPLE (STANTEC 2017)
- SURFACE WATER SAMPLE (STANTEC 2017)
- PHC EXCEEDANCE IN SOIL OR SEDIMENT
- PAH EXCEEDANCE IN SEDIMENT
- METALS EXCEEDANCE IN SOIL OR SURFACE WATER

TOWER
BB-SS50
BURIED METAL DEBRIS
BB-SS49
FORMER ANTENNA TOWER
BB-SS47
FORMER EMERGENCY SHELTER BUILDING
BB-VEG8
BB-TP42
2018-VEG09
2018-SS31
2018-SS30
2018-SS32
BB-SS46
2018-SS37
2018-SS33
FORMER ANTENNA TOWER
2018-SS36
2018-SS34
2018-SS35
2018-SS47
2018-SS42
BB-TP43
2018-VEG10
4 FORMER 9,547L DIESEL ASTs
BB-TP41
FORMER ANTENNA TOWER
BB-SS48
BB-TP40
2018-SS46
BB-TP39
BB-TP44
2018-SS43
5 FORMER 6,818L DIESEL ASTs
BB-SS45
BB-SS44
2018-VEG11
2018-SS45
2018-SS48
FORMER OPERATIONS BUILDING
2018-SS44
BB-VEG9
2018-SS39
FORMER ANTENNA TOWER
2018-SS38
BB-SS43
BB-SED5
2018-SS40
BB-SW5
2018-SS41
0 10 20 30 40 50
metres

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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER, SEDIMENT) PLAN - UPPER SITE

SCALE:	DATE:	REV. No.
1:800	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-11	CAD FILE: 121414998-EE-11DWG	

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APPENDIX B

Screening Checklists

SITE ASSESSMENT & TIER I/II TABLE CHECKLIST

Site Location:	Border Beacon, NL
Site Professional:	Jim Slade, P.Eng., P.Geo.
Date:	May 6, 2019

METHOD USED	
Tier I RBSL	✓
Tier II PSSL	
Tier II SSTL	

Minimum Site Assessment Requirements		
Issue	**Yes Or No***	**Comment**
PID, owner, location identified	Yes	
Current and anticipated future land use identified	Yes	
Review of underground services as conduits	Yes	
Historical review completed	Yes	See previous Phase I ESA completed.
Local groundwater use identified	Yes	
Adjacent land uses and receptors identified	Yes	
Ecological screening completed	Yes	
Soil and groundwater samples from all source areas obtained	Yes	
Soil and groundwater impacts delineated to Tier I RBSLs for potential receptor (adjacent property receptor may be lower Tier I RBSLs)	Yes	
Groundwater flow direction and gradient established	Yes	Assumed based on local topography
Combination of surface and sub-surface soil samples analyzed	Yes	
Free product observations made in soil and groundwater	Yes	
Low lab detection level for benzene in soil if potable water area	N/A	Non-potable area
Grain size and organic carbon analysis completed on soil	No	Used more conservative grain-size for RBSL. Total organic carbon analysis complete.
TPH fractionation done on soil and water if calculating Tier II SSTL	N/A	TPH fractionation done on soil.
Scale site plan showing all relevant site features	Yes	
Receptor building characteristics obtained (storeys, floor condition, ceiling height, *etc*.)	Yes	

Mandatory Conditions		
Issue	**Yes or No***	**Comment**
Non-aqueous phase liquids not present in groundwater	No	Petroleum hydrocarbon sheen was observed on groundwater in some monitor wells.
Potable water free of objectionable taste and odour	N/A	Non-potable site
Soils do not contain liquid and/or free petroleum product	No	Free product observed at the site from leaking drums.
Residual hydrocarbons do not create objectionable odours or explosive conditions in indoor or outdoor air	Yes	
Surface soil not stained	No	Staining observed in some areas of the site.
No dirt basement floors, sumps with dirt bottoms, *etc*.	Yes	
Confirmed that correct TPH type selected in RBSL or PSSL Table	Yes	
Confirmed that correct soil type selected in RBSL or PSSL Table	Yes	

Defaults Site Characteristics and Exposure Scenarios		
Issue	**Yes Or No***	**Comment**
Depth to groundwater approximately 3.0 metres	No	Groundwater at the site ranges between 1 mbgs to approximately 7.5 mbgs.
Impacted soil thickness is less than 3.0 metres	Yes	
Default foundation crack fraction is appropriate	Yes	
Default foundation thickness is appropriate	Yes	
Two floors exist if using a residential scenario	N/A	Not a residential site
Hydrocarbon impacts above RBSL or PSSL Table soil values are not within 0.3 m of foundation walls or floor slab	No	Impacts may be present within 0.3 m of buildings at the Camp / Antenna Areas and AES Compound – however, buildings are not used.
Confirmed that RBSL or PSSL Table criteria is correct for adjacent property receptors (i.e., use residential at property line if adjacent property is residential)	Yes	
Where exposure pathways have been eliminated at Tier II, detailed explanation provided in report explain why pathways are not relevant	N/A	
Where PSSLs tables are used based on elimination or control of a pathway that could be reopened by changes in site use, this condition is specified as a limitation in the report	N/A	
Where Tier II SSTLs have been calculated by changing default values, the report includes the parameter changed, the default value, the site-specific value used, and the rationale and/or detailed written justification	N/A	

* If no, indicate in comment section if and where in report the issue is addressed.
Consult the Best Management Practices (Appendix 2) for additional details.

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

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

Ecological Screening Component	Yes or No	Report name and location of details and explanations
Part I - Identification of petroleum hydrocarbons in media		
1. Do site characterization data indicate the presence of PHC in site surface soil (depth < 1.5 m) above the appropriate screening levels in Tables 1a and 1b?	Yes	Exceedances noted in surface soil at several areas (Refer to Tables F.1 and F.2, Appendix F).
2. Do site characterization data indicate the presence of PHC in shallow site groundwater (depth < 3.0 m) above appropriate ecological screening levels that were derived for the protection of terrestrial plants and soil invertebrates in contact with site groundwater in Table 2?	Yes	Exceedances noted in groundwater at several areas (Refer to Table F.11, Appendix F).
3. Do existing site characterization data indicate the presence of PHC in site groundwater above appropriate ecological screening levels derived for the protection of aquatic receptors in Table 3a/3b?		
4. Do site characterization data indicate the presence of PHC in site surface water above the appropriate screening levels in Table 3?	Yes	Exceedances noted in surface water at the Waste Disposal Sites (Refer to Table F.20, Appendix E).
5. Does site characterization indicate the presence of PHC in on-site or adjacent sediments above the appropriate screening levels in Table 4?	Yes	Exceedances noted in sediments at the Waste Disposal Sites and the Upper Site (Refer to Table F.16, Appendix F).
IF ALL ANSWERS IN PART I ARE"NO" THEN NO FURTHER ACTION IS REQUIRED		
Part II - Identification of habitat and ecological receptors		
1. Are the following habitat types or conditions present on the site or proximate to site within a minimum of 200 metres? • wetland habitats • aquatic habitats • forested habitats • grassland habitats • provincial/national parks or ecological reserves • known rare, threatened or endangered species • other known critical or sensitive habitat other local or regional receptor or habitat concerns	Yes	The Site is surrounded by tundra, forest, and plains. The Lower Site is surrounded by the waters of Ashuapun Lake. Site hydrocarbons in surface soil, surface water, sediment, and groundwater may come into contact with wildlife in these areas (Refer to Table 1.2 in the body of the text).

Ecological Screening Component		Yes or No	Report name and location of details and explanations
Part II - Identification of habitat and ecological receptors cont'd			
2a.	Are there visible indications of stressed vegetation on the site?	Yes	Stressed vegetation observed at the Waste Disposal Sites (Refer to Section 7.1 in the body of the text).
2b.	Is there evidence that the site vegetation community differs from what would be expected?	No	
2c.	Are there indications that the site soil cannot support a soil invertebrate community?	No	
3.	Is there evidence that terrestrial plants in the habitats above are likely to be in root contact with site groundwater above screening levels?	Yes	Exceedances of Tier I ESLs noted in groundwater at several areas
4.	Would wildlife receptors be expected to forage on or near the contaminated areas of the site?	Yes	
Part III - Identification of exposure pathways for ecological receptors			
1a.	Is it reasonable to conclude that site hydrocarbons in surface soil with concentrations exceeding applicable screening levels, will come into contact with terrestrial plants and invertebrates in a suitable habitat?	Yes	
1b.	Is it reasonable to conclude that site hydrocarbons in surface soil with concentrations exceeding applicable screening levels, will come into contact with mammalian, avian or herptile terrestrial receptors within an agricultural land use in a suitable habitat?	No	Agricultural land is not present within 200 m of the Site.
2.	Is it reasonable to conclude that dissolved hydrocarbons in site groundwater with concentrations exceeding applicable screening levels will come into contact with plants or soil invertebrates in a suitable habitat?	Yes	Exceedances of Tier I ESLs noted in groundwater at several areas.
3.	Is it reasonable to conclude that dissolved hydrocarbons in site groundwater with concentrations exceeding applicable screening levels will come into contact with aquatic receptors or aquatic receptor habitat?	Yes	Exceedances of Tier I ESLs noted in groundwater at several areas.
4.	Is it reasonable to conclude that site petroleum hydrocarbon contamination could impact aquatic receptors or aquatic habitat in surface water bodies via the following: a. surface runoff (*e.g.*, erosion, windblown contaminants) b. groundwater flow c. preferential overland flow pathways (*e.g.* drainage ditch, slope, swale) d. preferential subsurface flow pathways (*e.g.* culvert, trench, sewer line, pipelines, swales) such that aqueous media concentrations would potentially exceed surface water and/or sediment quality screening levels?	Yes	Possible unassessed preferential overland or subsurface flow pathways.
5.	Are there site specific conditions present, which were not considered in any section above that should require further ecological assessment?	No	
IF ALL ANSWERS IN PART III ARE"NO" THEN NO FURTHER ACTION IS REQUIRED			

APPENDIX C

Photos

Photo 1 – Lower Site – General Area: airstrip and Ashuapun Lake. Looking east.

Photo 2 – Lower Site – General Area: airstrip and Ashuapun Lake. Looking northwest.

Photo 3 – Lower Site – General Area: typical ground cover at the Site. Looking south.

Photo 4 – Camp / Antenna Areas and AES Compound: from left to right, Camp Fuel Shed, Camp Garage Building, Ten 4,500 L ASTs, and Dyked 113,516 L Tank. Looking north.

Photo 5 – Camp / Antenna Areas and AES Compound: Camp Garage Building with approximately 30 empty or partially filled drums on the south side of the structure (emptied and removed as part of the current assessment). Looking northeast.

Photo 6 – Camp / Antenna Areas and AES Compound: empty 4,546 L AST on east end of area. Looking south.

Photo 7 – Camp / Antenna Areas and AES Compound: Camp Garage Building. ASTs and Dyked Tank visible in background. Looking east.

Photo 8 – Camp / Antenna Areas and AES Compound: partially buried drums in berm surrounding 113,516 L tank (emptied as part of the current assessment). Looking south.

Photo 9 – Camp / Antenna Areas and AES Compound: Full 900L AST lying against south-facing exterior wall of Camp Garage Building (emptied and removed as part of the current assessment). Looking north.

Photo 10 – Camp / Antenna Areas and AES Compound: ten 4,500 L ASTs and Dyked 113,516 L Tank in background, re-fueling Area in foreground. Looking north.

Photo 11 – Camp / Antenna Areas and AES Compound: four (4) full drums southeast of former re-fueling area (emptied and removed as part of the current assessment. Looking north.

Photo 12 – Unknown Foundation / Building: Burned remains of former building. Looking east.

Photo 13 – Waste Disposal Sites: Drum Disposal Site (Site #1). Drums also beneath snow. Looking south.

Photo 14 – Waste Disposal Sites: Solid Waste Disposal Area (Site #3) Trenches. Looking west.

Photo 15 – Waste Disposal Sites: Drums emptied as part of current assessment were stored along the edge of the Drum Disposal Site (Site #1). Looking southwest.

Photo 16 – Waste Disposal Sites: pond north of Drum / Waste Diposal Site (Site #1). Looking east.

Photo 17 – Former Innu Camp: two wooden buildings surrounded by garbage and debris. Looking southwest.

Photo 18 – Former Innu Camp: camp in foreground, Ashuapun Lake in background. Looking east.

Photo 19 – General Dump Site: debris and garbage surround an open pit. Looking northwest.

Photo 20 – General Dump Site: majority of debris surrounds the pit. Looking west.

Photo 21 – General Dump Site: Standing water in base of pit. Looking west.

Photo 22 – Upper Site: concrete slab and pillars of Former Operations Building. Looking northwest.

Photo 23 – Upper Site: concrete slab and pillars of Former Operations Building. Looking southwest.

Photo 24 – Upper Site: buried metal debris near eastern former antenna tower.

Photo 25 – Upper Site: buried metal debris at Former Operations Building. Looking south.

APPENDIX D

Coordinates of Sample Locations

Table D.1 Coordinates of Sample Locations
Phase III Environmental Site Assessment
Former Military Site, Border Beacon, NL
Stantec Project No. 121414998

Year	Sample ID	Northing	Easting
2017	BB-SED1	6132144.02	487203.24
2017	BB-SED2	6132160.32	487441.05
2017	BB-SED5	6131990.49	483008.16
2017	BB-SED9	6132007.64	488059.24
2017	BB-SED10	6131633.88	486416.20
2017	BB-SED11	6131499.06	486099.84
2017	BB-SED12	6131663.57	486194.03
2017	BB-SS1	6131802.86	486217.90
2017	BB-SS2	6131768.54	486334.09
2017	BB-SS3	6131955.09	486684.78
2017	BB-SS4	6131837.30	486683.14
2017	BB-SS5	6131775.03	486731.57
2017	BB-SS6	6131788.19	486845.79
2017	BB-SS7	6131887.45	487020.15
2017	BB-SS8	6132092.93	487259.26
2017	BB-SS9	6131906.34	487459.72
2017	BB-SS10	6132057.82	487770.31
2017	BB-SS11	6132062.21	487781.55
2017	BB-SS13	6131680.18	486209.35
2017	BB-SS14	6131693.87	486238.73
2017	BB-SS15	6131658.93	486216.64
2017	BB-SS16	6131681.04	486255.72
2017	BB-SS17	6131654.73	486247.44
2017	BB-SS18	6131645.70	486263.66
2017	BB-SS19	6131560.94	486358.64
2017	BB-SS20	6131566.67	486390.78
2017	BB-SS21	6131536.75	486374.13
2017	BB-SS22	6131531.19	486428.22
2017	BB-SS23	6131536.82	486184.45
2017	BB-SS24	6131875.50	486345.19
2017	BB-SS25	6131858.83	486348.62
2017	BB-SS26	6131884.41	486359.89
2017	BB-SS27	6131892.92	486381.50
2017	BB-SS28	6131889.97	486424.29
2017	BB-SS29	6131890.97	486443.24
2017	BB-SS30	6131911.07	486456.71
2017	BB-SS31	6131889.63	486464.85
2017	BB-SS32	6131900.92	486506.89
2017	BB-SS33	6131877.64	486517.93
2017	BB-SS34	6131900.10	486521.57
2017	BB-SS35	6131899.14	486532.32
2017	BB-SS36	6131903.56	486577.13
2017	BB-SS37	6131910.01	486584.64
2017	BB-SS38	6131878.78	486387.74
2017	BB-SS40	6131889.23	486602.92
2017	BB-SS41	6132009.72	488029.00
2017	BB-SS42	6131990.24	488039.24
2017	BB-SS43	6131969.31	482936.31
2017	BB-SS44	6132001.59	482926.34
2017	BB-SS45	6132000.19	482903.11
2017	BB-SS46	6132004.91	482852.45
2017	BB-SS47	6132076.80	482922.23
2017	BB-SS48	6132010.36	482965.04
2017	BB-SS49	6132088.47	482936.49
2017	BB-SS50	6132135.97	482941.10

Year	Sample ID	Northing	Easting
2017	BB-SW1	6132144.02	487203.24
2017	BB-SW2	6132160.32	487441.05
2017	BB-SW5	6131990.49	483008.16
2017	BB-SW9	6132007.64	488059.24
2017	BB-SW10	6131633.88	486416.20
2017	BB-SW11	6131499.06	486099.84
2017	BB-SW12	6131663.57	486194.03
2017	BB-TP1	6131784.37	486880.15
2017	BB-TP3	6131692.76	486205.34
2017	BB-TP4	6131662.77	486229.36
2017	BB-TP5	6131690.35	486259.67
2017	BB-TP6	6131700.29	486310.74
2017	BB-TP7	6131650.14	486278.77
2017	BB-TP8	6131642.24	486249.74
2017	BB-TP9	6131636.91	486341.37
2017	BB-TP10	6131690.06	486378.08
2017	BB-TP11	6131687.30	486411.15
2017	BB-TP12	6131559.75	486340.78
2017	BB-TP13	6131574.61	486365.81
2017	BB-TP14	6131546.34	486353.69
2017	BB-TP15	6131523.53	486394.29
2017	BB-TP16	6131545.37	486427.93
2017	BB-TP17	6131877.45	486349.76
2017	BB-TP18	6131895.67	486356.86
2017	BB-TP19	6131885.10	486372.47
2017	BB-TP20	6131900.52	486369.71
2017	BB-TP21	6131900.14	486388.93
2017	BB-TP22	6131889.67	486387.61
2017	BB-TP23	6131890.91	486408.07
2017	BB-TP24	6131903.28	486415.80
2017	BB-TP25	6131881.77	486441.50
2017	BB-TP26	6131899.95	486457.10
2017	BB-TP28	6131906.62	486511.41
2017	BB-TP30	6131883.56	486522.38
2017	BB-TP31	6131913.37	486572.93
2017	BB-TP32	6131921.24	486585.54
2017	BB-TP33	6131895.84	486596.02
2017	BB-TP34	6131883.39	486597.98
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2017	BB-TP36	6131956.73	487786.24
2017	BB-TP37	6132018.75	488020.05
2017	BB-TP38	6131987.50	488047.49
2017	BB-TP39	6132004.13	482897.99
2017	BB-TP40	6132006.91	482904.92
2017	BB-TP41	6132012.06	482926.28
2017	BB-TP42	6132033.97	482919.46
2017	BB-TP43	6132015.85	482937.40
2017	BB-TP44	6132007.10	482939.10
2017	BB-TP49	6131859.91	487246.52
2017	BB-TP50	6131544.83	486090.62
2017	BB-VEG1	6132060.10	486939.18
2017	BB-VEG4	6131685.09	486191.20
2017	BB-VEG5	6131634.05	486258.33
2017	BB-VEG8	6132040.35	482923.53
2017	BB-VEG9	6131983.16	482909.60

*Coordinates are in UTM-20

Table D.1 Coordinates of Sample Locations (cont.)
Phase III Environmental Site Assessment
Former Military Site, Border Beacon, NL
Stantec Project No. 121414998

Year	Sample ID	Northing	Easting
2018	2018-AP1	6131994.215	488044.6127
2018	2018-AP2	6132014.276	488030.9675
2018	2018-BH03	6131893.715	486604.1952
2018	2018-BH04	6131918.93	486574.5346
2018	2018-BH07	6131873.337	486519.4189
2018	2018-BH10	6131894.146	486454.562
2018	2018-BH12	6131877.259	486444.5432
2018	2018-BH13	6131887.309	486438.2366
2018	2018-BH15	6131899.369	486420.1212
2018	2018-BH16	6131901.031	486407.0299
2018	2018-BH19	6131904.076	486365.5841
2018	2018-BH22	6131862.966	486388.6176
2018	2018-BH23	6131877.618	486396.331
2018	2018-BH24	6131882.04	486404.0088
2018	2018-BH25	6131888.796	486414.9065
2018	2018-BH28	6131878.214	486355.3156
2018	2018-BH29	6131850.274	486354.1315
2018	2018-BH30	6131856.237	486344.1364
2018	2018-BH35	6131669.685	486237.6672
2018	2018-BH36	6131696.983	486226.8404
2018	2018-BH44	6131383.222	485993.59
2018	2018-BH45	6131383.759	485964.8511
2018	2018-MW01	6131887.624	486602.3021
2018	2018-MW02	6131911.782	486572.7043
2018	2018-MW05	6131909.73	486511.5846
2018	2018-MW06	6131879.642	486519.4629
2018	2018-MW08	6131870.357	486555.2922
2018	2018-MW09	6131902.711	486455.857
2018	2018-MW11	6131895.084	486438.8323
2018	2018-MW14	6131899.9	486414.2478
2018	2018-MW17	6131919.248	486397.9894
2018	2018-MW18	6131902.305	486393.0505
2018	2018-MW20	6131873.515	486388.5823
2018	2018-MW21	6131884.764	486376.5525
2018	2018-MW26	6131888.692	486382.5433
2018	2018-MW27	6131882.954	486348.31
2018	2018-MW31	6131861.543	486348.2761
2018	2018-MW32	6131876.944	486330.5514
2018	2018-MW33	6131644.872	486236.2576
2018	2018-MW34	6131652.541	486275.3613
2018	2018-MW37	6131638.904	486366.6112
2018	2018-MW38	6131570.394	486389.1122
2018	2018-MW39	6131548.771	486399.7674
2018	2018-MW40	6131530.251	486378.9011
2018	2018-MW41	6131555.147	486353.2836
2018	2018-MW42	6131372.136	485980.3583
2018	2018-MW43	6131395.738	485977.2609
2018	2018-MW46	6131566.679	486806.6788
2018	2018-MW47	6131888.595	486968.3276
2018	2018-MW48	6131894.351	487440.067
2018	2018-MW49	6131689.051	486392.9046
2018	2018-MW50	6131904.18	486382.3614
2018	2018-MW51	6131918.184	486382.1267
2018	2018-MW52	6131913.875	486371.9
2018	2018-MW53	6131928.905	486369.8529

Year	Sample ID	Northing	Easting
2018	2018-SED01	6131594.36	486827.37
2018	2018-SED02	6131588.24	486625.71
2018	2018-SED03	6131628.81	486187.18
2018	2018-SED04	6131595.19	486495.00
2018	2018-SED05	6131386.55	485978.38
2018	2018-SED06	6131773.30	487397.17
2018	2018-SED07	6131891.25	486301.32
2018	2018-SED08	6131950.91	486381.99
2018	2018-SED09	6131927.51	486526.33
2018	2018-SS01	6131885.25	486606.53
2018	2018-SS02	6131889.57	486597.72
2018	2018-SS03	6131914.36	486568.20
2018	2018-SS04	6131914.32	486577.65
2018	2018-SS05	6131908.08	486572.61
2018	2018-SS06	6131906.42	486506.64
2018	2018-SS07	6131905.58	486516.22
2018	2018-SS08	6131874.08	486513.63
2018	2018-SS09	6131898.25	486461.43
2018	2018-SS10	6131903.55	486454.25
2018	2018-SS11	6131893.19	486447.57
2018	2018-SS12	6131902.18	486375.42
2018	2018-SS13	6131900.25	486363.76
2018	2018-SS14	6131871.23	486351.26
2018	2018-SS15	6131853.85	486350.75
2018	2018-SS16	6131870.04	486340.82
2018	2018-SS17	6131870.33	486368.50
2018	2018-SS18	6131878.51	486340.82
2018	2018-SS19	6131549.67	486403.74
2018	2018-SS20	6131544.78	486409.24
2018	2018-SS21	6131538.90	486403.63
2018	2018-SS22	6131397.42	485960.19
2018	2018-SS23	6131398.55	485991.77
2018	2018-SS24	6131360.10	485983.20
2018	2018-SS25	6131370.47	485953.83
2018	2018-SS26	6131568.59	486791.94
2018	2018-SS27	6131560.67	486790.13
2018	2018-SS28	6131553.81	486788.22
2018	2018-SS29	6131556.00	486801.01
2018	2018-SS30	6132010.86	482845.62
2018	2018-SS31	6132010.00	482852.66
2018	2018-SS32	6132010.95	482859.84
2018	2018-SS33	6132004.80	482857.90
2018	2018-SS34	6131998.13	482860.03
2018	2018-SS35	6131999.83	482852.41
2018	2018-SS36	6131998.27	482845.54
2018	2018-SS37	6132004.94	482847.81
2018	2018-SS38	6131969.71	482952.09
2018	2018-SS39	6131977.00	482959.23
2018	2018-SS40	6131969.59	482967.33
2018	2018-SS41	6131962.11	482959.32
2018	2018-SS42	6132017.50	482926.49
2018	2018-SS43	6132007.97	482931.52
2018	2018-SS44	6131993.80	482926.47
2018	2018-SS45	6131995.76	482916.37
2018	2018-SS46	6132007.06	482921.75

*Coordinates are in UTM-20

Table D.1 Coordinates of Sample Locations (cont.)
Phase III Environmental Site Assessment
Former Military Site, Border Beacon, NL
Stantec Project No. 121414998

Year	Sample ID	Northing	Easting
2018	2018-SS47	6132017.20	482919.50
2018	2018-SS48	6131996.00	482936.35
2018	2018-SS49	6131810.05	486391.15
2018	2018-SS50	6132017.81	487924.89
2018	2018-SW01	6131594.36	486827.37
2018	2018-SW02	6131588.24	486625.71
2018	2018-SW03	6131628.81	486187.18
2018	2018-SW04	6131595.19	486495.00
2018	2018-SW05	6131386.55	485978.38
2018	2018-SW06	6131773.30	487397.17
2018	2018-SW07	6131891.25	486301.32
2018	2018-SW08	6131950.91	486381.99
2018	2018-SW09	6131927.51	486526.33
2018	2018-VEG01	6131904.41	486561.10
2018	2018-VEG02	6131912.48	486358.44
2018	2018-VEG03	6131446.17	485966.31
2018	2018-VEG04	6131394.47	485967.77
2018	2018-VEG05	6131635.68	486207.37
2018	2018-VEG06	6131637.89	486384.52
2018	2018-VEG07	6131531.79	486790.70
2018	2018-VEG09	6132018.29	482878.16
2018	2018-VEG10	6132013.94	482908.65
2018	2018-VEG11	6132004.32	482926.84

*Coordinates are in UTM-20

APPENDIX E

Symbols and Terms, Borehole and Monitor Well Records

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4-8
Stiff	1.0 - 2.0	50 – 100	8-15
Very Stiff	2.0 - 4.0	100 - 200	15-30
Hard	>4.0	>200	>30

ROCK DESCRIPTION

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	*Very Poor Quality*
25-50	*Poor Quality*
50-75	*Fair Quality*
75-90	*Good Quality*
90-100	*Excellent Quality*

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	*Crushed*
Severely Fractured	*Shattered or Very Blocky*
Fractured	*Blocky*
Moderately Jointed	*Sound*
Intact	*Very Sound*

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	*Extremely Wide*	-
2000-6000	*Very Wide*	*Very Thick*
600-2000	*Wide*	*Thick*
200-600	*Moderate*	*Medium*
60-200	*Close*	*Thin*
20-60	*Very Close*	*Very Thin*
<20	*Extremely Close*	*Laminated*
<6	-	*Thinly Laminated*

Terminology describing rock strength:

Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 – 5
Weak	R2	5 – 25
Medium Strong	R3	25 – 50
Strong	R4	50 – 100
Very Strong	R5	100 – 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.

Boulders Cobbles Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Meta-morphic Bedrock | Sedi-mentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

measured in standpipe, piezometer, or well

inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

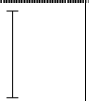
Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

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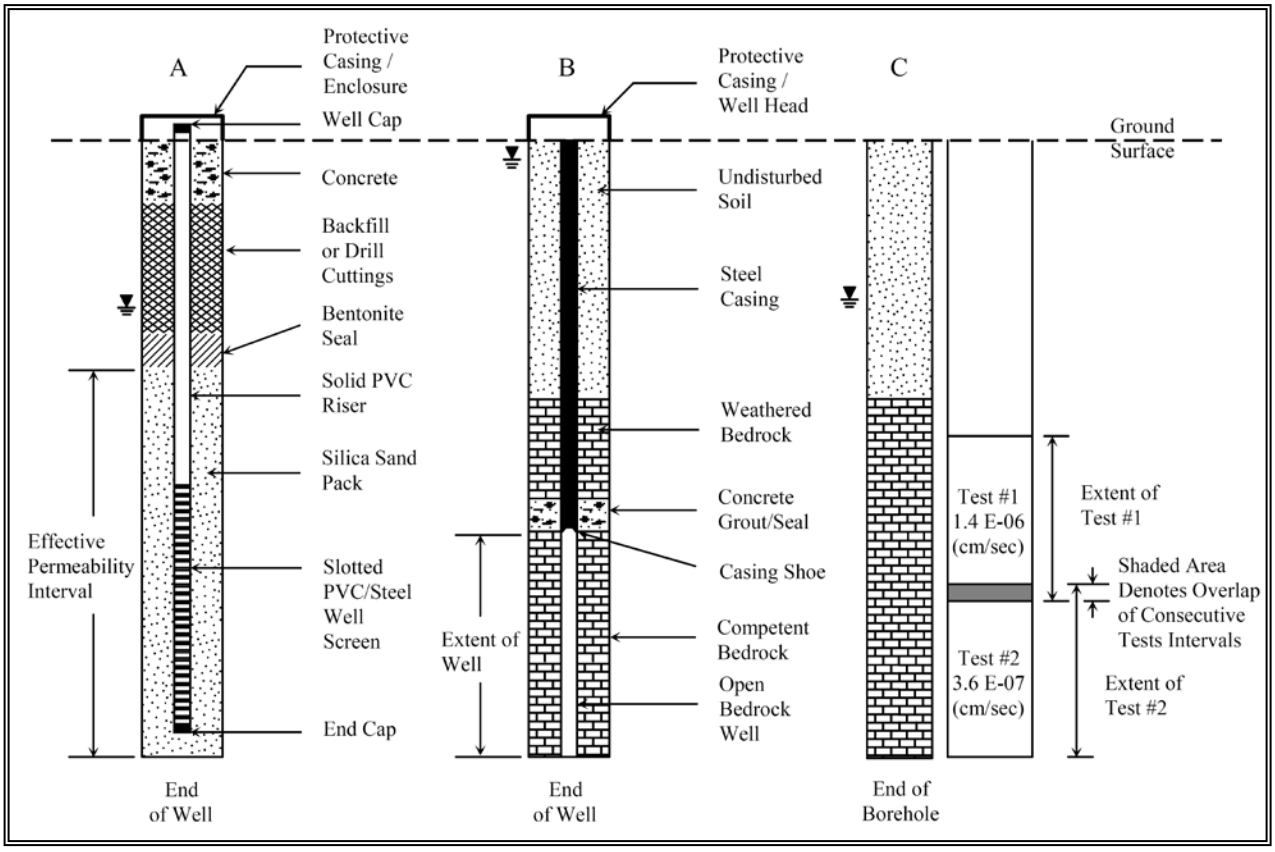
SYMBOLS AND TERMS USED ON MONITOR WELL, WATER WELL AND ENVIRONMENTAL RECORDS

Well Construction and Permeability Testing

Basic symbols used in typical monitor or water well and piezometer construction are shown below. The well construction symbols or materials shown below may be combined or altered to suit a particular application. The diagram shows: A) a typical piezometer or monitor well in overburden; B) a typical water well in bedrock; C) borehole permeability test results in bedrock.



Apparent Moisture Content

Terminology used to describe apparent moisture content at the time of borehole drilling or test pit excavation.

Symbol	Description
D	Dry – containing little or no moisture
M	Moist – containing some moisture without having 'free' moisture
S	Saturated – 'free' moisture can drain from material

Terminology Describing Contamination

Symbol	Description
PID	Photo Ionization Detector (readings in ppm)
TPH	Total Petroleum Hydrocarbon concentration (readings in ppm based on mass)
ppm	Parts Per Million (measurement of concentration, mg/kg or mg/L)
nd	Not Detected – below limit of quantification (LOQ)

Apparent Hydrocarbon Odour

Terminology used to describe apparent hydrocarbon odour at the time of borehole drilling or test pit excavation.

Value	Description
0	No apparent odour
1	Slight odour
2	Moderate odour
3	Strong odour

Stantec — BOREHOLE RECORD

BOREHOLE No. **2018-BH03**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **5.80m** **07-12-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.11	Well graded, brown SAND (SW) to fine, light brown SAND (SW). Some rootlets to 1.50 mbgs.			GP	01	610	-		0	0	nd	nd	nd	nd	nd
1					GP	02	711	-		0	0	-	-	-	-	-
2					GP	03	635	-		0	0	-	-	-	-	-
3					GP	04	686	-		0	0.1	-	-	-	-	-
4					GP	05	483	-		0	0	-	-	-	-	-
5					GP	06	279	-		0	0	-	-	-	-	-
6	443.8			▽	GP	07	152	-		0	0	-	-	-	-	-
7		End of Borehole Groundwater encountered at ~5.8 mbgs. Bedrock not encountered.														
8																
9																
10																

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BOREHOLE RECORD

BOREHOLE No. **2018-BH04**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	-	Well graded, brown SAND (SW) with gravel.			GP	01	355	-		2	0.2	3300	nd	nd	nd	nd
1					GP	02	485	-		1	0.7	-	-	-	-	-
2					GP	03	610	-		1	1.8	-	-	-	-	-
3					GP	04	710	-		2	1.5	-	-	-	-	-
4					GP	05	610	-		2	11.8	79	nd	nd	nd	nd
	4.7				GP	06	25	-		0	-	-	-	-	-	-
5		End of Borehole Refusal on frozen sand at 4.7 mbgs. Groundwater not encountered. Bedrock not encountered.														
6																
7																
8																
9																
10																

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BOREHOLE RECORD

BOREHOLE No. **2018-BH07**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.47	Well graded, brown SAND (SW) with gravel.			GP	01	560	-		0	0.2	-	-	-	-	-
1					GP	02	635	-		0	0.4	-	-	-	-	-
2					GP	03	485	-		0	0.1	-	-	-	-	-
3					GP	04	560	-		0	0	-	-	-	-	-
4	446.0				GP	05	560	-		1	0	nd	nd	nd	nd	nd
5		End of Borehole Groundwater not encountered. Bedrock not encountered.														
6																
7																
8																
9																
10																

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BOREHOLE RECORD

BOREHOLE No. **2018-BH10**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **6.40m** **07-12-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.91	Well graded, brown SAND (SW) with gravel.			GP	01	510	-		1	2	nd	nd	nd	nd	nd
1					GP	02	610	-		1	0	-	-	-	-	-
2					GP	03	710	-		0	0	-	-	-	-	-
3					GP	04	685	-		0	0	-	-	-	-	-
4					GP	05	610	-		0	0.1	-	-	-	-	-
5					GP	06	610	-		0	0.2	-	-	-	-	-
6					GP	07	610	-		1-2	1.1	-	-	-	-	-
7	443.7			▽	GP	08	635	-		3	22.9	2500	nd	nd	0.063	2.700
8		End of Borehole Groundwater encountered at ~6.4 mbgs. Bedrock not encountered.														
9																
10																

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BOREHOLE RECORD

BOREHOLE No. **2018-BH12**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.63	Well graded, brown SAND (SW) with gravel.			GP	01	455	-		0	0	15	nd	nd	nd	nd
1					GP	02	455	-		0	0	-	-	-	-	-
2					GP	03	560	-		0	0	-	-	-	-	-
3					GP	04	710	-		1	0	-	-	-	-	-
4					GP	05	710	-		1	0	-	-	-	-	-
5					GP	06	685	-		2	0	-	-	-	-	-
6					GP	07	735	-		2	0	-	-	-	-	-
7	443.4				GP	08	610	-		3	17.9	5800	nd	nd	nd	1.200
		End of Borehole Groundwater not encountered. Bedrock not encountered.														
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BOREHOLE RECORD

BOREHOLE No. **2018-BH13**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **6.40m** **07-12-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.43	Well graded, brown SAND (SW) with gravel.			GP	01	585	-		0	0	nd	nd	nd	nd	nd
1					GP	02	610	-		0	0	-	-	-	-	-
2					GP	03	785	-		0	0	-	-	-	-	-
3					GP	04	785	-		1	0.3	-	-	-	-	-
4					GP	05	635	-		1	0	-	-	-	-	-
5					GP	06	660	-		2	0	-	-	-	-	-
6					GP	07	585	-		2	0	-	-	-	-	-
7	443.2			▽	GP	08	635	-		0	0	nd	nd	nd	nd	nd
		End of Borehole Groundwater encountered at ~6.4 mbgs. Bedrock not encountered.														
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BOREHOLE RECORD

BOREHOLE No. **2018-BH15**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **6.10m** **07-11-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.99	Well graded, brown SAND (SW) with gravel.			GP	01	485	-		0	0	-	-	-	-	-
1					GP	02	355	-		0	0	nd	nd	nd	nd	nd
2					GP	03	815	-		0	0	-	-	-	-	-
3					GP	04	455	-		1	0	-	-	-	-	-
4					GP	05	355	-		1	0	-	-	-	-	-
5					GP	06	150	-		1	0.3	-	-	-	-	-
6				▽	GP	07	0	-		-	-	-	-	-	-	-
7	442.8				GP	08	230	-		2	0.1	2300	nd	nd	0.052	0.370
		End of Borehole Groundwater encountered at ~6.1 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH16**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.99	Well graded, brown SAND (SW) with gravel.			GP	01	510	-		1	0	-	-	-	-	-
1					GP	02	610	-		1	0	-	-	-	-	-
2	447.4				GP	03	710	-		1	0.4	nd	nd	nd	nd	nd
3		End of Borehole Refusal on cobbles at 2.6 mbgs Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH19**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **3.90m** **07-15-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	448.90	Well graded, brown SAND (SW) with gravel.			GP	01	660	-		0	70	-	-	-	-	-
1					GP	02	685	-		1	80.2	-	-	-	-	-
2					GP	03	485	-		1	69.3	-	-	-	-	-
3					GP	04	535	-		1	71.4	-	-	-	-	-
4	444.4			▽	GP	05	330	-		2	88.4	3800	nd	nd	nd	nd
5		End of Borehole Groundwater encountered at ~3.9 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH22**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **5.80m** **07-13-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.88	Well graded, brown SAND (SW) with gravel.			GP	01	535	-		0	0	-	-	-	-	-
1					GP	02	230	-		0	0	-	-	-	-	-
2					GP	03	585	-		0	0	-	-	-	-	-
3					GP	04	510	-		0	0	-	-	-	-	-
4					GP	05	610	-		1	0	-	-	-	-	-
5					GP	06	760	-		1	0	-	-	-	-	-
6	443.6			▽	GP	07	710	-		1	0	nd	nd	nd	nd	nd
7		End of Borehole Groundwater encountered at ~5.8 mbgs. Bedrock not encountered.														
8																
9																
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BOREHOLE RECORD

BOREHOLE No. **2018-BH23**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **5.50m** **07-13-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.90	Well graded, brown SAND (SW) with gravel.			GP	01	660	-		0	0	nd	nd	nd	nd	nd
1					GP	02	685	-		0	0	-	-	-	-	-
2					GP	03	455	-		0	0	-	-	-	-	-
3					GP	04	535	-		0	0	-	-	-	-	-
4					GP	05	560	-		0	0	-	-	-	-	-
5				▽	GP	06	510	-		0	0	-	-	-	-	-
6	443.6				GP	07	685	-		1	3	-	-	-	-	-
7		End of Borehole Groundwater encountered at ~5.5 mbgs. Bedrock not encountered.														
8																
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH24**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.67	Well graded, brown SAND (SW) with gravel.			GP	01	585	-		1	0	29	nd	nd	nd	nd
1					GP	02	610	-		0	0	-	-	-	-	-
2					GP	03	560	-		0	0	-	-	-	-	-
3					GP	04	535	-		0	0	-	-	-	-	-
4					GP	05	660	-		0	0	-	-	-	-	-
5					GP	06	735	-		0	0	-	-	-	-	-
6	443.4				GP	07	735	-		1	0	nd	nd	nd	nd	nd
7		End of Borehole Groundwater not encountered. Bedrock not encountered.														
8																
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH25**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **5.80m** **07-13-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.72	Well graded, brown SAND (SW) with gravel.			GP	01	535	-		0	0	nd	nd	nd	nd	nd
1					GP	02	635	-		0	0	-	-	-	-	-
2					GP	03	560	-		0	0	-	-	-	-	-
3					GP	04	660	-		0	0.1	-	-	-	-	-
4					GP	05	635	-		1	0	-	-	-	-	-
5					GP	06	560	-		1	0.1	-	-	-	-	-
6	443.4			▽	GP	07	380	-		-	0.1	1400	nd	nd	nd	0.240
		End of Borehole Groundwater encountered at ~5.8 mbgs. Bedrock not encountered.														
7																
8																
9																
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH28**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18** WATER LEVEL **5.80m** **07-14-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.34	Well graded, brown SAND (SW) with gravel.			GP	01	380	-		0	2.6	-	-	-	-	-
1					GP	02	430	-		2	0.5	1100	nd	nd	nd	nd
2					GP	03	585	-		2	7.8	-	-	-	-	-
3					GP	04	510	-		2	5	-	-	-	-	-
4					GP	05	380	-		1	0.2	-	-	-	-	-
5					GP	06	535	-		1	0.9	-	-	-	-	-
6	444.0			▽	GP	07	380	-		3	1.3	-	-	-	-	-
7		End of Borehole Groundwater encountered at ~5.8 mbgs. Bedrock not encountered.														
8																
9																
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH29**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.29	Well graded, brown SAND (SW) with gravel.			GP	01	585	-		1	0	100	nd	0.098	nd	0.300
1					GP	02	405	-		1	0.7	-	-	-	-	-
2	447.6				GP	03	125	-		1	0	-	-	-	-	-
3		End of Borehole Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH30**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.45	Well graded, brown SAND (SW) with gravel.			GP	01	660	-		0	0	-	-	-	-	-
1					GP	02	585	-		0	0	-	-	-	-	-
2					GP	03	660	-		0	0	-	-	-	-	-
3					GP	04	610	-		0	0	-	-	-	-	-
4					GP	05	535	-		0	0	-	-	-	-	-
5					GP	06	330	-		1	0	-	-	-	-	-
6	444.2				GP	07	380	-		3	31.5	2300	nd	nd	1.200	-
		End of Borehole Groundwater not encountered. Bedrock not encountered.														
7																
8																
9																
10																

Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH35**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **5.30m** **07-16-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.27	Well graded, brown SAND (SW) with gravel.			GP	01	485	-		0	0	-	-	-	-	-
1					GP	02	355	-		0	0	-	-	-	-	-
2					GP	03	510	-		0	0	-	-	-	-	-
3					GP	04	535	-		0	0	-	-	-	-	-
4					GP	05	760	-		0	0	-	-	-	-	-
5	443.9			▽	GP	06	180	-		0	0.1	nd	nd	nd	nd	nd
6		End of Borehole Groundwater encountered at ~5.3 mbgs. Bedrock not encountered.														
7																
8																
9																
10																

Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH36**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.54	Well graded, brown SAND (SW) with gravel.			GP	01	455	-		0	0	nd	nd	nd	nd	nd
1					GP	02	180	-		0	0	-	-	-	-	-
2					GP	03	405	-		0	0	-	-	-	-	-
3					GP	04	455	-		0	0	-	-	-	-	-
4					GP	05	485	-		0	0	-	-	-	-	-
5	445.3				GP	06	455	-		0	0	-	-	-	-	-
		End of Borehole Refusal encountered at 5.2 mbgs. Groundwater not encountered. Bedrock not encountered.														
6																
7																
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-BH44**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	448.98	Well graded, brown SAND (SW) with gravel.			GP	01	455	-		0	0	nd	nd	nd	nd	nd
1					GP	02	455	-		0	0	-	-	-	-	-
2					GP	03	535	-		0	0	-	-	-	-	-
3					GP	04	535	-		0	0	-	-	-	-	-
4					GP	05	455	-		0	0	-	-	-	-	-
5	443.6				GP	06	455	-		0	0	-	-	-	-	-
		End of Borehole Groundwater encountered at ~4.9 mbgs. Bedrock not encountered.														
6																
7																
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BOREHOLE RECORD

BOREHOLE No. **2018-BH45**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	447.62															
	447.4	Topsoil & peat														
		Well graded, brown SAND (SW) with gravel.			GP	01	405	-		0	0	nd	nd	nd	nd	nd
1					GP	02	305	-		0	0	-	-	-	-	-
2					GP	03	0	-		-	-	-	-	-	-	-
3					GP	04	205	-		0	0.3	-	-	-	-	-
4																
5	442.2															
		End of Borehole														
6		Groundwater not encountered.														
		Bedrock not encountered.														
7																
8																
9																
10																

Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW02**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	CHEMICAL ANALYSIS (ppm) TPH	CHEMICAL ANALYSIS (ppm) BENZENE	CHEMICAL ANALYSIS (ppm) TOLUENE	CHEMICAL ANALYSIS (ppm) ETHYLBENZENE	CHEMICAL ANALYSIS (ppm) XYLENES
0	-	Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 3.9 mbgs.			GP	01	425	-		3	3.4	-	-	-	-	-
1					GP	02	550	-		2	9	-	-	-	-	-
2					GP	03	750	-		2	5.5	-	-	-	-	-
3					GP	04	650	-		1	0.5	-	-	-	-	-
	3.9				GP	05	300	-		1	1.1	1700	-	-	-	-
4		End of Borehole Refusal on frozen sand at 3.9 mbgs. Groundwater not encountered. Bedrock not encountered.														
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BOREHOLE RECORD

BOREHOLE No. **2018-MW05**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.21	Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 3.6 mbgs.			GP	01	25	-		0	-	nd	nd	nd	nd	nd
1					GP	02	100	-		0	-	-	-	-	-	-
2					GP	03	710	-		0	0	-	-	-	-	-
3					GP	04	510	-		0	0	-	-	-	-	-
4	444.7				GP	05	405	-		0	0	-	-	-	-	-
5		End of Borehole Refusal on frozen sand at 4.5 mbgs. Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW06**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.48	Well graded, brown SAND (SW) with gravel.			GP	01	510	-		1	0	-	-	-	-	-
1					GP	02	785	-		1	0	-	-	-	-	-
2					GP	03	710	-		3	1.1	4400	nd	0.064	0.960	8.500
3					GP	04	510	-		3	0.3	-	-	-	-	-
4	446.2				GP	05	305	-		2	0.2	nd	nd	nd	nd	nd
		End of Borehole Refusal on unknown obstacle at 4.3 mbgs. Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW08**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18** WATER LEVEL **5.20m** **07-09-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.27	Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 3.9 mbgs.			GP	01	455	-		0	0.1	nd	nd	nd	nd	nd
1					GP	02	660	-		0	0	-	-	-	-	-
2					GP	03	305	-		0	0.7	-	-	-	-	-
3					GP	04	0	-		0	-	-	-	-	-	-
4					GP	05	0	-		0	-	-	-	-	-	-
5	445.0			▽	GP	06	0	-		0	-	-	-	-	-	-
		End of Borehole Refusal on frozen sand at 5.3 mbgs. Groundwater encountered at 5.2 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW21**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18** WATER LEVEL **4.30m** **07-14-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.98	Well graded, brown SAND (SW) with gravel.			GP	01	405	-		0	0.5	-	-	-	-	-
1					GP	02	405	-		1	0	820	nd	nd	nd	nd
2					GP	03	535	-		0	0	-	-	-	-	-
3					GP	04	230	-		0	0	-	-	-	-	-
4				▽	GP	05	150	-		0	0	-	-	-	-	-
5					GP	06	0	-		1	-	-	-	-	-	-
6					GP	07	0	-		1	-	-	-	-	-	-
7					GP	08	0	-		1	-	-	-	-	-	-
8	441.9				GP	09	25	-		2	-	-	-	-	-	-
		End of Borehole Groundwater encountered at 4.3 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW38**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **5.20m** **07-16-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	-	Well graded, brown SAND (SW) with gravel.			GP	01	430	-		0	0	-	-	-	-	-
1					GP	02	510	-		0	0	nd	nd	nd	nd	nd
2					GP	03	510	-		0	0	-	-	-	-	-
3					GP	04	685	-		0	0	-	-	-	-	-
4					GP	05	710	-		0	0	-	-	-	-	-
5				▽	GP	06	330	-		0	0	-	-	-	-	-
6					GP	07	405	-		0	0	-	-	-	-	-
7	7.2				GP	08	535	-		0	0	nd	nd	nd	nd	nd
		End of Borehole Groundwater encountered at ~5.2 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW40**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **4.30m** **07-16-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.09															
	450.0	Topsoil & moss														
		Well graded, brown SAND (SW) with gravel.			GP	01	535	-		0	0	nd	nd	nd	nd	nd
1					GP	02	535	-		0	0.1	-	-	-	-	-
2					GP	03	485	-		0	0	-	-	-	-	-
3					GP	04	610	-		0	0.1	-	-	-	-	-
4				▽	GP	05	255	-		0	0	-	-	-	-	-
5	444.7				GP	06	430	-		0	0.1	-	-	-	-	-
		End of Borehole														
6		Groundwater encountered at ~4.3 mbgs.														
		Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW42**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.91	Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 5.3 mbgs.			GP	01	510	-		0	0.1	nd	nd	nd	nd	nd
1					GP	02	535	-		0	0	-	-	-	-	-
2					GP	03	685	-		0	0	-	-	-	-	-
3					GP	04	660	-		0	0	-	-	-	-	-
4					GP	05	560	-		0	0	-	-	-	-	-
5	444.5				GP	06	485	-		0	0.1	-	-	-	-	-
6		End of Borehole Refusal on frozen sand at 5.4 mbgs. Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW48**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-17-18** WATER LEVEL **N/A**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	449.45	Well graded, brown SAND (SW) with gravel.			GP	01	585	-		0	0	nd	nd	nd	nd	nd
1					GP	02	535	-		0	0	-	-	-	-	-
2					GP	03	560	-		0	0	-	-	-	-	-
3					GP	04	660	-		0	0	-	-	-	-	-
4					GP	05	585	-		0	0	-	-	-	-	-
	444.6				GP	06	305	-		0	0	nd	nd	nd	nd	nd
5		End of Borehole Refusal on frozen sand at 4.9 mbgs Groundwater not encountered. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW49**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-17-18** WATER LEVEL **4.90m** **07-17-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	450.86	Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 1.5 mbgs.			GP	01	585	-		0	0	nd	nd	nd	nd	nd
1					GP	02	840	-		0	0	-	-	-	-	-
2					GP	03	455	-		0	0	-	-	-	-	-
3					GP	04	330	-		0	0	-	-	-	-	-
4					GP	05	455	-		0	0	-	-	-	-	-
	446.2				GP	06	150	-		0	0	-	-	-	-	-
5		End of Borehole Refusal on frozen sand at 4.7 mbgs. Groundwater encountered at ~4.9 mbgs. Bedrock not encountered.		▽												
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW51**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **2.70m** **07-11-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	448.81	Well graded, brown SAND (SW) with gravel.			GP	01	510	-		0	0.3	-	-	-	-	-
1					GP	02	230	-		0	0.2	-	-	-	-	-
2				▽	GP	03	660	-		0	0.7	nd	nd	nd	nd	nd
3	445.2				GP	04	485	-		0	0	-	-	-	-	-
		End of Borehole Groundwater encountered at ~2.7 mbgs. Bedrock not encountered.														
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Stantec

BOREHOLE RECORD

BOREHOLE No. **2018-MW52**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-10-18** WATER LEVEL **2.60m** **07-10-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD	SAMPLES OTHER TESTS	SAMPLES HYDROCARBON ODOUR	CHEMICAL ANALYSIS (ppm) PID READINGS (ppm)	TPH	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
0	448.97	Well graded, brown SAND (SW) with gravel.			GP	01	685	-		0	0.2	-	-	-	-	-
1					GP	02	485	-		0	0.4	-	-	-	-	-
2				▽	GP	03	560	-		0	0.8	-	-	-	-	-
3					GP	04	560	-		1	10.5	-	-	-	-	-
4	444.5				GP	05	305	-		2	36.4	590	nd	nd	nd	nd
5		End of Borehole Groundwater encountered at ~2.6 mbgs. Bedrock not encountered.														
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MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW01**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18** WATER LEVEL **5.30m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.429 m STICK UP)
	450.17						mm						J-PLUG
0		Well graded, brown SAND (SW) to fine light brown SAND (SW). Partially frozen lenses of fine SAND (SW) between 2 - 4 mbgs.			GP	01	406	-	0	d	0	-	25 mm DIAMETER SOLID PVC
1					GP	02	559	-	0	d	0.2	nd	
2					GP	03	330	-	0	m	0	-	
3					GP	04	610	-	0	m	0.4	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4					GP	05	559	-	0	m	0	-	
5				▼	GP	06	406	-	0	s	0.1	-	
6	443.87				GP	07	250	-	0	s	2.2	nd	END CAP
		End of Borehole Groundwater encountered at 5.73 mbgs. Bedrock not encountered.											
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MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW09**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **6.80m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.439 m STICK UP)
	450.69						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	560	-	0	d	0	-	25 mm DIAMETER SOLID PVC
1					GP	02	610	-	1	d	0	nd	
2					GP	03	660	-	0	m	0	-	
3					GP	04	685	-	0	m	0.1	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4					GP	05	560	-	0	m	0	-	
5					GP	06	560	-	0	m	0	-	
6					GP	07	610	-	0	m	0	-	
7				▼	GP	08	560	-	0	s	0	-	
8	442.59				GP	09	455	-	0	s	0	-	END CAP
		End of Borehole Groundwater encountered at 7.242 mbgs Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW11**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-12-18** WATER LEVEL **6.55m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.379 m STICK UP)
	450.40						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 2.7 mbgs.			GP	01	560	-	1	d	0	460	25 mm DIAMETER SOLID PVC
1					GP	02	685	-	1	d	0.2	-	
2					GP	03	785	-	0	d	0.2	-	
3					GP	04	785	-	0	m	0	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4					GP	05	660	-	2	m	1.5	-	
5					GP	06	735	-	1	m	2.9	-	
6					GP	07	660	-	1	m	0.1	-	
7				▼	GP	08	660	-	0	s	0.1	nd	
					GP	09	915	-	0	s	0	-	
8	442.30												END CAP
		End of Borehole Groundwater encountered at 6.932 mbgs Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW14**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **6.17m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.659 m STICK UP)
	450.01						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel. Frozen SAND (SW) at 1.8 mbgs.			GP	01	455	-	1	m	1.3	-	25 mm DIAMETER SOLID PVC
1					GP	02	710	-	2	m	1	-	
2					GP	03	735	-	1	m	0	17	
3					GP	04	405	-	1	m	3.2	-	
4					GP	05	75	-	1	m	0	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
5					GP	06	355	-	2	m	0.3	-	
6				▼	GP	07	430	-	2	m	2.9	57	
7					GP	08	255	-	3	m	63.3	-	END CAP
					GP	09	100	-	2	m	0	-	CAVE-IN
8	441.91	End of Borehole Groundwater encountered at 6.829 mbgs Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW17**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **2.56m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.404 m STICK UP)
	448.82						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	635	-	0	m	0	-	BENTONITE
1					GP	02	535	-	0	m	0.5	-	25 mm DIAMETER SOLID PVC
2				▼	GP	03	485	-	2	m	16.1	-	
3					GP	04	405	-	2	s	75.6	1800	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4	444.32				GP	05	0	-	-	s	-	-	END CAP
5		End of Borehole Groundwater encountered at 2.965 mbgs Bedrock not encountered.											
6													
7													
8													
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW18**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-09-18 to 07-10-18** WATER LEVEL **3.10m 07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.429 m STICK UP)
	448.61						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel to coarse SAND (SW).			GP	01	425	-	0	d	0.4	-	25 mm DIAMETER SOLID PVC
1					GP	02	500	-	0	d	0	-	
2					GP	03	425	-	0	d	0.3	-	
3				▼	GP	04	300	-	0	m	0.5	-	
4					GP	05	25	-	0	s	-	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
5					GP	06	425	-	3	s	208	3300	
6	442.31				GP	07	375	-	2	s	6.4	-	END CAP
7		End of Borehole Groundwater encountered at 3.532 mbgs. Bedrock not encountered.											
8													
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW20**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **6.05m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.436 m STICK UP)
	449.93						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	485	-	1	d	1.9	-	
1					GP	02	635	-	1	d	1.1	200	25 mm DIAMETER SOLID PVC
2					GP	03	585	-	1	d	0.7	-	
3					GP	04	535	-	2	m	8.6	-	
4					GP	05	535	-	2	m	0	-	
5					GP	06	760	-	2	m	0	-	
6				▼	GP	07	785	-	2	m-s	0.8	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
7					GP	08	760	-	3	s	660	7100	
					GP	09	760	-	3	s	59.3	-	
8	441.83												END CAP
		End of Borehole Groundwater encountered at 6.486 mbgs. Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW26**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-13-18** WATER LEVEL **5.91m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.381 m STICK UP)
	449.74						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	485	-	2	d	0	-	
1					GP	02	535	-	1	d	0	-	
2					GP	03	635	-	2	d	1.6	-	25 mm DIAMETER SOLID PVC
3					GP	04	635	-	2	m	2.5	-	
4					GP	05	455	-	1	m	0.3	-	
5					GP	06	560	-	1	m	0	-	
6				▼	GP	07	405	-	2-3	m-s	2.6	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
7					GP	08	560	-	2-3	s	0.2	3700	
					GP	09	535	-	1	s	5.3	-	
8	441.64												END CAP
		End of Borehole Groundwater encountered at 2.294 mbgs. Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW27**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18** WATER LEVEL **7.55m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.386 m STICK UP)
0	450.38												J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	560	-	2	m	6	800	
1					GP	02	560	-	2	m	1.6	-	
2					GP	03	535	-	2	m	3.3	-	25 mm DIAMETER SOLID PVC
3					GP	04	510	-	2	m	0.1	-	
4					GP	05	485	-	2	m	1.5	-	
5					GP	06	455	-	2	m	2.5	-	
6					GP	07	405	-	2	m	1.9	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
7					GP	08	125	-	3	s	-	400	
7				▼	GP	09	50	-	3	s	-	-	
8	442.28												END CAP
8		End of Borehole Groundwater encountered at 7.932 mbgs. Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW31**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-14-18 to 07-15-18** WATER LEVEL **6.16m 07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY mm	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.094 m STICK UP)
0	450.37												J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	685	-	1	m	0.5	1300	
1					GP	02	560	-	0	d	0	-	
2					GP	03	510	-	0	d	0.1	-	25 mm DIAMETER SOLID PVC
3					GP	04	510	-	0	m	0	-	
4					GP	05	735	-	0	m	0.1	-	
5					GP	06	760	-	1	m	15.6	-	
6				▼	GP	07	610	-	1	s	329.4	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
7					GP	08	585	-	1	s	193.4	-	
8	442.27				GP	09	125	-	3	s	-	1800	END CAP
8		End of Borehole Groundwater encountered at 6.610 mbgs. Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW32**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **7.06m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.396 m STICK UP)
	450.91						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	585	-	1	d-m	75.3	-	25 mm DIAMETER SOLID PVC
1					GP	02	355	-	2	m	34.4	1700	
2					GP	03	660	-	2	m	12.4	-	
3					GP	04	560	-	2	m	51.6	-	
4					GP	05	230	-	2	m	14.3	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
5					GP	06	230	-	2	m	2.4	-	
6					GP	07	455	-	3	m	6.6	-	
7				▼	GP	08	380	-	3	s	2.1	-	
8	442.81				GP	09	330	-	3	s	70.2	5300	END CAP
		End of Borehole Groundwater encountered at 7.456 mbgs. Bedrock not encountered.											
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW33**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **1.68m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.274 m STICK UP)
	448.26						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	710	-	0	d	0	nd	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1				▼	GP	02	685	-	0	d-s	0	-	
2					GP	03	405	-	0	s	0.1	-	
	445.56												END CAP
3		End of Borehole Groundwater encountered at 1.956 mbgs. Bedrock not encountered.											
4													
5													
6													
7													
8													
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW34**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **0.99m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.376 m STICK UP)
	447.58						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.		▼	GP	01	660	-	0	d-s	0	nd	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1					GP	02	455	-	0	s	0.1	-	
2					GP	03	660	-	0	s	0	-	
	444.88												END CAP
3		End of Borehole Groundwater encountered at 1.367 mbgs. Bedrock not encountered.											
4													
5													
6													
7													
8													
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW37**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **1.19m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.351 m STICK UP)
	449.30						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	660	-	0	d	0	nd	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1				▼	GP	02	610	-	0	s	0	-	
2					GP	03	610	-	0	s	0	-	
	446.60												END CAP
3		End of Borehole Groundwater encountered at 1.541 mbgs. Bedrock not encountered.											
4													
5													
6													
7													
8													
9													
10													

Stantec

MONITOR WELL RECORD

BOREHOLE No. **2018-MW39**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-16-18** WATER LEVEL **1.93m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.219 m STICK UP)
	449.57						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel to coarse brown SAND (SW).			GP	01	710	-	0	d	0	nd	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1					GP	02	710	-	0	m-s	0	-	
2				▼	GP	03	455	-	0	s	0	nd	
	446.87												END CAP
3		End of Borehole Groundwater encountered at 2.153 mbgs. Bedrock not encountered.											
4													
5													
6													
7													
8													
9													
10													

Stantec

MONITOR WELL RECORD

BOREHOLE No. **2018-MW41**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18 to 07-16-18** WATER LEVEL **4.58m 07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.645 m STICK UP)
	449.25						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	405	-	2	m	27.8	4200	
1					GP	02	485	-	2	m	297.2	-	
2					GP	03	535	-	0	m	7.6	-	
3					GP	04	485	-	0	d	7.6	-	
4					GP	05	405	-	0	m	2.8	-	
5	443.85			▼	GP	06	380	-	0	m	1	nd	
		End of Borehole Groundwater encountered at 5.227 mbgs. Bedrock not encountered.											
6													
7													
8													
9													
10													

Stantec

MONITOR WELL RECORD

BOREHOLE No. **2018-MW43**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-15-18** WATER LEVEL **5.41m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (1.021 m STICK UP)
	449.50						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	455	-	0	d	0	nd	
1					GP	02	455	-	0	d	0	-	
2					GP	03	610	-	0	d	0	-	
3					GP	04	380	-	0	d	0	-	
4					GP	05	510	-	0	m	0	-	
5				▼	GP	06	535	-	0	m	0	-	
6					GP	07	305	-	0	s	0	nd	
7					GP	08	355	-	0	s	0.2	-	
8	441.40				GP	09	180	-	0	s	0.2	-	
		End of Borehole Groundwater encountered at 6.435 mbgs. Bedrock not encountered.											
9													
10													

Stantec

MONITOR WELL RECORD

BOREHOLE No. **2018-MW46**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-17-18** WATER LEVEL **3.69m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
	449.02						mm						0.112 m STICK UP J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	455	-	0	d	0	nd	
1					GP	02	330	-	0	d	0	-	
2					GP	03	455	-	0	m	0	-	
3				▼	GP	04	455	-	0	m	0	-	
4					GP	05	405	-	0	s	0	-	
5	443.62				GP	06	305	-	0	s	0.1	-	
		End of Borehole Groundwater encountered at 3.801 mbgs. Bedrock not encountered.											
6													
7													
8													
9													
10													

MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW47**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-17-18** WATER LEVEL **4.09m** **07-19-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.61 m STICK UP)
	450.40						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	535	-	0	d	0	nd	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1					GP	02	535	-	0	d	0	-	
2					GP	03	660	-	0	d	0	-	
3					GP	04	560	-	0	d	0	-	
4				▼	GP	05	230	-	0	d	0	-	
5	445.00				GP	06	355	-	0	s	0	nd	END CAP
		End of Borehole Groundwater encountered at 4.704 mbgs. Bedrock not encountered.											
6													
7													
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MONITOR WELL RECORD

Stantec

BOREHOLE No. **2018-MW50**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-10-18** WATER LEVEL **3.95m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.406 m STICK UP)
	448.15						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	600	-	0	d	0.6	-	25 mm DIAMETER SOLID PVC
1					GP	02	675	-	0	d	1.2	-	
2					GP	03	550	-	0	m	1.3	-	
3					GP	04	675	-	2	s	0.1	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4				▼	GP	05	425	-	2	s	86.4	7000	
5	442.75				GP	06	300	-	1	s	8.1	-	END CAP
		End of Borehole Groundwater encountered at 4.354 mbgs. Bedrock not encountered.											
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MONITOR WELL RECORD

BOREHOLE No. **2018-MW53**
PAGE **1** of **1**
PROJECT No. **121414998**
DRILLING METHOD **GEOPROBE**
SIZE **50 mm**
DATUM **Assumed**

CLIENT **Department of Municipal Affairs and Environment**
PROJECT **Phase III ESA and HHERA**
LOCATION **Border Beacon, NL**
DATES (mm-dd-yy): BORING **07-11-18** WATER LEVEL **1.12m** **07-18-18**

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS (0.398 m STICK UP)
	447.39						mm						J-PLUG
0		Well graded, brown SAND (SW) with gravel.			GP	01	610	-	0	m-d	0.1	-	25 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
1	445.87			▼	GP	02	405	-	0	s	0.7	nd	END CAP
		End of Borehole											
2		Refusal at 1.520 mbgs.											
		Groundwater encountered at 1.520 mbgs.											
3		Bedrock not encountered.											
4													
5													
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APPENDIX F

Laboratory Analytical Summary Tables

Table F.1 Results of Laboratory Analysis of Petroleum Hydrocarbons in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)							Resemblance
			Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	>C_{16}-<C_{21}	>C_{21}-<C_{32}	F3 (C_{16}-C_{32})	Returned to baseline?[4]	Modified TPH[5]	
	RDL		0.025	0.025	0.025	0.050	2.5	10	10	15	25	-	15	-
	Tier I ESLs - Plants and Soil Inv.[1]		180	250	300	350	320	260			1,700	-	-	-
	Tier I ESLs - Wildlife and Livestock[2]		18	980	640	2,600	11,000	9,800			16,000	-	-	-
	Tier I RBSLs[3]		2.5	10,000	10,000	110	-	-			-	-	870/4,000/ 10,000	-
Lower Site - General Area														
2017	BB-SS1	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS3	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS4	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS5	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS6	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS8	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	23	23	Yes	23	PLO
2017	BB-SS9	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS9 Lab-Dup	-	-	-	-	-	-	nd	nd	nd	nd	-	-	-
2017	BB-SS10	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP1-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP49-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW47-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW47-GP06	4.5 - 5.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW48-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW48-GP06	4.5 - 5.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Camp / Antenna Areas and AES Compound														
2017	BB-SS24	0.0 - 0.1	nd	nd	nd	nd	nd	2,100	660	380	1,000	No	3,200	WFO. LO
2017	BB-SS25	0.0 - 0.1	nd	nd	nd	nd	nd	56	260	4,300	4,600	No	4,600	LO
2017	BB-SS26	0.0 - 0.1	nd	nd	nd	nd	nd	42	38	60	98	Yes	140	WFO. LO
2017	BB-SS27	0.0 - 0.1	nd	nd	nd	nd	nd	6,300	1,200	300	1,500	Yes	7,800	WFO. LO
2017	BB-SS28	0.0 - 0.1	nd	nd	nd	nd	nd	33	18	nd	18	Yes	51	FO
2017	BB-SS29	0.0 - 0.1	nd	nd	nd	nd	3.7	4,300	1,700	120	1,800	Yes	6,100	FO
2017	BB-SS30	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS301 (Fld-Dup of BB-SS30)	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS31	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS32	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	50	50	Yes	50	LO
2017	BB-SS33	0.0 - 0.1	nd	nd	nd	nd	12	4,100	210	23	230	Yes	4,300	WFO
2017	BB-SS34	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS35	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS36	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS37	0.0 - 0.1	nd	nd	nd	nd	nd	nd	13	84	97	Yes	98	FO/LO. LO
2017	BB-SS40	0.0 - 0.1	nd	nd	nd	nd	52	1,100	74	18	92	Yes	1,300	FO
2017	BB-SS40 Lab-Dup	-	nd	nd	nd	nd	65	-	nd	nd	nd	-	-	-
2017	BB-TP17-BS2	0.25 - 0.50	nd	nd	nd	nd	130	4,600	1,300	1,600	2,900	Yes	7,600	WFO. LO
2017	BB-TP18-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	67	36	44	80	Yes	150	WFO. LO
2017	BB-TP19-BS2	0.25 - 0.50	nd	nd	nd	nd	3.1	240	200	1,200	1,400	No	1,600	WFO. LO
2017	BB-TP20-BS2	0.25 - 0.50	nd	nd	nd	nd	20	2,900	2,400	610	3,000	Yes	6,000	WFO. LO
2017	BB-TP201-BS2 (Fld-Dup of BB-TP20-BS2)	0.25 - 0.50	nd	nd	nd	nd	23	3,200	2,500	570	3,100	Yes	6,300	WFO. LO
2017	BB-TP21-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP22-BS2	0.25 - 0.50	nd	nd	nd	nd	27	1,200	190	40	230	Yes	1,400	WFO
2017	BB-TP221-BS2 (Fld-Dup of BB-TP22-BS2)	0.25 - 0.50	nd	nd	nd	nd	16	1,100	170	43	210	Yes	1,300	WFO. PLO
2017	BB-TP221-BS2 Lab-Dup	-	nd	nd	nd	nd	17	-	nd	nd	nd	-	-	-
2017	BB-TP23-BS2	0.25 - 0.50	nd	nd	nd	nd	3.9	1,400	140	nd	140	Yes	1,500	WFO
2017	BB-TP24-BS2	0.25 - 0.50	nd	nd	nd	nd	54	3,400	370	58	430	Yes	3,900	WFO
2017	BB-TP25-BS2	0.25 - 0.50	nd	nd	nd	nd	6.1	2,700	470	46	520	Yes	3,200	WFO
2017	BB-TP25-BS2 Lab-Dup	-	-	-	-	-	-	3,200	570	58	630	-	-	-
2017	BB-TP26-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP27-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	12	11	46	57	Yes	70	WFO. LO
2017	BB-TP28-BS2	0.25 - 0.50	nd	nd	nd	nd	89	5,600	620	97	720	Yes	6,400	WFO
2017	BB-TP30-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP31-BS2	0.25 - 0.50	nd	nd	nd	0.057	66	**32,000**	2,900	nd	2,900	Yes	35,000	FO
2017	BB-TP32-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP33-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	20	200	220	No	220	LO
2017	BB-TP34-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP35-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP35-BS1 Lab-Dup	-	nd	nd	nd	nd	nd	-	nd	nd	nd	-	-	-
2017	BB-TP35-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP35-BS2 Lab-Dup	-	-	-	-	-	-	nd	nd	nd	nd	-	-	-
2018	2018-SS01	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS02	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS03	0.0 - 0.2	nd	nd	nd	nd	10	2,800	460	27	490	Yes	3,300	WFO
2018	2018-SS04	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.

2 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil / lube oil impacts (July 2012, revised January 2015).

4 = Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

5 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

"-" = not analyzed, not applicable or no applicable guideline.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

Underlined = Value exceeds Tier I ESLs - Plants and Soil Invertebrates (surface soil only).

Bold = Value exceeds Tier I ESLs - Wildlife and Livestock (surface soil only).

Shaded = Value exceeds Tier I RBSLs.

Resemblance:

PLO = Possible lube oil fraction.
LO = Lube oil fraction / One product in lube oil range.
ULO = Unidentified compound(s) in lube oil range.

WFO = Weathered fuel oil fraction.
FO = Fuel oil fraction / One product in the fuel oil range.
FO/LO = One product in fuel/lube oil range.

G = One product in the gasoline range.
G/FO = One product in gas/fuel oil range.

Table F.1 Results of Laboratory Analysis of Petroleum Hydrocarbons in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)							Resemblance
			Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	>C_{16}-<C_{21}	>C_{21}-<C_{32}	F3 (C_{16}-C_{32})	Returned to baseline?[4]	Modified TPH[5]	
	RDL		0.025	0.025	0.025	0.050	2.5	10	10	15	25	-	15	-
	Tier I ESLs - Plants and Soil Inv.[1]		180	250	300	350	320	260			1,700	-	-	-
	Tier I ESLs - Wildlife and Livestock[2]		18	980	640	2,600	11,000	9,800			16,000	-	-	-
	Tier I RBSLs[3]		2.5	10,000	10,000	110	-	-			-	-	870/4,000/ 10,000	-
Camp / Antenna Areas and AES Compound (cont'd)														
2018	2018-SS05	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS06	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS07	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS08	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS09	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	24	24	Yes	24	PLO. ULO
2018	2018-SS60 (Fld-Dup of 2018-SS09)	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	19	19	Yes	19	PLO
2018	2018-SS10	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS11	0.0 - 0.2	nd	nd	nd	nd	nd	23	72	32	100	Yes	130	FO/LO
2018	2018-SS12	0.0 - 0.2	nd	nd	nd	nd	nd	50	61	290	350	No	400	FO. LO
2018	2018-SS12 Lab-Dup	-	nd	nd	nd	nd	nd	-	-	-	-	-	-	-
2018	2018-SS13	0.0 - 0.2	nd	nd	nd	nd	5.8	150	74	71	150	Yes	300	WFO. LO
2018	2018-SS61 (Fld-Dup of 2018-SS13)	0.0 - 0.2	nd	nd	nd	nd	5.9	700	270	76	350	Yes	1,100	WFO
2018	2018-SS14	0.0 - 0.2	nd	nd	nd	nd	39	2,500	430	220	650	Yes	3,200	WFO. LO
2018	2018-SS62 (Fld-Dup of 2018-SS14)	0.0 - 0.2	nd	nd	nd	nd	28	2,000	370	210	580	Yes	2,600	WFO. LO
2018	2018-SS15	0.0 - 0.2	nd	nd	nd	nd	nd	200	24	82	110	Yes	300	WFO. LO
2018	2018-SS16	0.0 - 0.2	nd	nd	nd	nd	nd	19	24	220	240	No	260	FO. LO
2018	2018-SS17	0.0 - 0.2	nd	nd	nd	nd	12	550	38	22	60	Yes	620	FO
2018	2018-SS18	0.0 - 0.2	nd	nd	nd	nd	nd	75	40	89	130	Yes	200	FO. LO
2018	2018-SS49	0.0 - 0.2	nd	nd	nd	nd	nd	50	nd	nd	nd	Yes	50	FO
2018	2018-BH03-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH03-GP07	5.4 - 6.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH04-GP01	0.0 - 0.9	nd	nd	nd	nd	71	3,000	210	20	230	Yes	3,300	FO
2018	2018-BH04-GP05	3.6 - 4.5	nd	nd	nd	nd	6.2	72	nd	nd	nd	Yes	79	FO
2018	2018-BH04-GP05 Lab-Dup	-	nd	nd	nd	nd	7.4	-			-	-	-	-
2018	2018-BH07-GP05	3.6 - 4.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH07-GP05 Lab-Dup	-	nd	nd	nd	nd	nd	-			-	-	-	-
2018	2018-BH10-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH10-GP08	6.3 - 7.2	nd	nd	0.063	2.7	120	2,200	220	nd	220	Yes	2,500	FO
2018	2018-BH12-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	15	nd	nd	nd	Yes	15	WFO
2018	2018-BH12-GP08	6.3 - 7.2	nd	nd	nd	1.2	61	5,100	610	nd (75)	610	Yes	5,800	FO
2018	2018-BH12-GP08 Lab-Dup	-	nd	nd	nd	1.2	66	-			-	-	-	-
2018	2018-BH13-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH13-GP08	6.3 - 7.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH63-GP08 (Fld-Dup of 2018-BH13-GP08)	6.3 - 7.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH15-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH15-GP08	6.3 - 7.2	nd	nd	0.052	0.37	200	2,000	99	nd	99	Yes	2,300	FO
2018	2018-BH16-GP03	1.8 - 2.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH19-GP05	3.6 - 4.5	nd	nd	nd	nd	210	2,800	610	130	740	Yes	3,800	FO
2018	2018-BH22-GP01	0.0 - 0.9	nd	nd	nd	nd	33	nd	nd	nd	nd	Yes	33	G
2018	2018-BH22-GP07	5.4 - 6.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH23-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH24-GP01	0.0 - 0.9	nd	nd	nd	nd	16	13	nd	nd	nd	Yes	29	FO
2018	2018-BH24-GP07	5.4 - 6.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH25-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH25-GP07	5.4 - 6.3	nd	nd	nd	0.24	230	1,100	61	nd	61	Yes	1,400	FO
2018	2018-BH25-GP07 Lab-Dup	-	-	-	-	-	-	1,300			71	-	-	-
2018	2018-BH67-GP07 (Fld-Dup of 2018-BH25-GP07)	5.4 - 6.3	nd	nd	nd	0.21	180	820	49	nd	49	Yes	1,100	FO
2018	2018-BH28-GP02	0.9 - 1.8	nd	nd	nd	nd	130	900	87	nd	87	Yes	1,100	FO
2018	2018-BH29-GP01	0.0 - 0.9	nd	0.098	nd	0.3	22	41	18	21	39	Yes	100	FO
2018	2018-BH30-GP07	5.4 - 6.3	nd	nd	nd	1.2	230	1,800	190	62	250	Yes	2,300	FO
2018	2018-MW01-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW01-GP07	5.4 - 6.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW02-GP04	2.7 - 3.6	nd	nd	nd	nd	41	1,500	190	nd	190	Yes	1,700	FO
2018	2018-MW05-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW05-GP02 Lab-Dup	-	-	-	-	-	nd	nd	nd	nd	nd	-	-	-
2018	2018-MW06-GP03	1.8 - 2.7	nd	0.064	0.96	8.5	620	3,700	58	nd	58	Yes	4,400	WFO
2018	2018-MW06-GP05	3.6 - 4.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW08-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW09-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW11-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	420	46	nd	46	Yes	460	FO
2018	2018-MW62-GP01 (Fld-Dup of 2018-MW11-GP01)	0.0 - 0.9	nd	nd	nd	nd	nd	550	60	22	82	Yes	630	FO
2018	2018-MW11-GP08	6.3 - 7.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW14-GP03	1.8 - 2.7	nd	nd	nd	nd	nd	17	nd	nd	nd	Yes	17	FO
2018	2018-MW60-GP03 (Fld-Dup of 2018-MW14-GP03)	1.8 - 2.7	nd	nd	nd	nd	3.6	15	nd	nd	nd	Yes	19	FO
2018	2018-MW14-GP07	5.4 - 6.3	nd	nd	nd	nd	18	39	nd	nd	nd	Yes	57	FO
2018	2018-MW17-GP04	2.7 - 3.6	nd	nd	nd	nd	110	1,600	140	nd	140	Yes	1,800	WFO
2018	2018-MW18-GP06	4.5 - 5.4	nd	nd	nd	0.32	-	-			-	Yes	-	FO
2018	2018-MW20-GP02	0.9 - 1.8	nd	nd	nd	nd	180	19	nd	nd	nd	Yes	200	G
2018	2018-MW20-GP08	6.3 - 7.2	nd	nd	0.26	13	1200	5,500	360	<75	360	Yes	7,100	G. FO
2018	2018-MW21-GP02	0.9 - 1.8	nd	nd	nd	nd	23	620	110	71	180	Yes	820	FO
2018	2018-MW26-GP08	6.3 - 7.2	nd	nd	nd	0.14	77	3,100	430	53	480	Yes	3,700	FO
2018	2018-MW27-GP01	0.0 - 0.9	nd	nd	nd	nd	9.1	720	44	36	80	Yes	800	FO
2018	2018-MW27-GP08	6.3 - 7.2	nd	nd	nd	0.34	94	250	32	25	57	Yes	400	FO
2018	2018-MW27-GP08 Lab-Dup	-	-	-	-	-	220	30			20	-	-	-
2018	2018-MW31-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	31	100	1200	1,300	No	1,300	LO
2018	2018-MW31-GP09	7.2 - 8.1	nd	nd	nd	3.1	460	1,200	150	64	210	Yes	1,800	FO
2018	2018-MW32-GP02	0.9 - 1.8	nd	nd	nd	nd	97	1,500	100	nd	100	Yes	1,700	WFO
2018	2018-MW32-GP09	7.2 - 8.1	nd	nd	nd	2.0	-	-			-	No	-	FO. LO
2018	2018-MW50-GP05	3.6 - 4.5	nd	nd	nd	0.23	230	5,800	850	95	950	Yes	7,000	FO
2018	2018-MW51-GP03	1.8 - 2.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW52-GP05	3.6 - 4.5	nd	nd	nd	nd	86	430	80	nd	80	Yes	590	FO
2018	2018-MW53-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.

2 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil / lube oil impacts (July 2012, revised January 2015).

4 = Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

5 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

"-" = not analyzed, not applicable or no applicable guideline.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

Underlined = Value exceeds Tier I ESLs - Plants and Soil Invertebrates (surface soil only).

Bold = Value exceeds Tier I ESLs - Wildlife and Livestock (surface soil only).

Shaded = Value exceeds Tier I RBSLs.

Resemblance:

PLO = Possible lube oil fraction.
LO = Lube oil fraction / One product in lube oil range.
ULO = Unidentified compound(s) in lube oil range.
WFO = Weathered fuel oil fraction.
FO = Fuel oil fraction / One product in the fuel oil range.
FO/LO = One product in fuel/lube oil range.
G = One product in the gasoline range.
G/FO = One product in gas/fuel oil range.

Table F.1 Results of Laboratory Analysis of Petroleum Hydrocarbons in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)							Resemblance
			Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	>C_{16}-<C_{21}	>C_{21}-<C_{32}	F3 (C_{16}-C_{32})	Returned to baseline?[4]	Modified TPH[5]	
	RDL		0.025	0.025	0.025	0.050	2.5	10	10	15	25	-	15	-
	Tier I ESLs - Plants and Soil Inv. [1]		180	250	300	350	320	260			1,700	-	-	-
	Tier I ESLs - Wildlife and Livestock [2]		18	980	640	2,600	11,000	9,800			16,000	-	-	-
	Tier I RBSLs [3]		2.5	10,000	10,000	110	-	-			-	-	870/4,000/ 10,000	-
Unknown Foundation / Building														
2017	BB-TP36-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP36-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP37-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP38-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS50	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	17	17	Yes	17	ULO
2018	2018-AP1-BS2	0.6 - 1.2	nd	nd	nd	nd	nd	nd	nd	20	20	Yes	20	PLO
2018	2018-AP2-BS1	0 - 0.6	nd	nd	nd	nd	nd	nd	nd	17	17	Yes	17	ULO
Waste Disposal Sites														
2017	BB-SS13	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS14	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS15	0.0 - 0.1	nd	nd	nd	nd	nd	nd	40	250	290	No	290	LO
2017	BB-SS16	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	21	21	Yes	21	PLO
2017	BB-SS17	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS17 Lab-Dup	-	-	-	-	-	nd	nd	nd	nd	nd	-	-	-
2017	BB-SS18	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	31	31	Yes	31	ULO
2017	BB-SS19	0.0 - 0.1	nd	nd	nd	nd	nd	nd	22	290	310	No	310	LO
2017	BB-SS19 Lab-Dup	-	nd	nd	nd	nd	nd	-	nd	nd	nd	-	-	-
2017	BB-SS20	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	79	79	Yes	79	LO
2017	BB-SS21	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	46	46	Yes	46	PLO
2017	BB-SS22	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	21	21	Yes	21	PLO
2017	BB-SS23	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	24	24	Yes	24	PLO
2017	BB-TP3-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP4-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP5-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP6-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP7-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	31	31	Yes	31	ULO. PLO
2017	BB-TP71-BS1 (Fld-Dup of BB-TP7-BS1)	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	28	28	Yes	28	PLO
2017	BB-TP7-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP8-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	20	120	140	Yes	140	FO. LO
2017	BB-TP9-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP10-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP101-BS2 (Fld-Dup of BB-TP10-BS2)	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP11-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP12-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP121-BS1 (Fld-Dup of BB-TP12-BS1)	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP12-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP13-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP14-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	27	27	Yes	27	ULO
2017	BB-TP14-BS2 Lab-Dup	-	nd	nd	nd	nd	nd	-	nd	nd	nd	-	-	-
2017	BB-TP15-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	27	27	Yes	27	ULO
2017	BB-TP151-BS2 (Fld-Dup of BB-TP15-BS2)	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-TP16-BS2	0.25 - 0.50	nd	nd	nd	nd	130	1,800	430	nd	430	Yes	2,300	WFO
2017	BB-TP161-BS2 (Fld-Dup of BB-TP16-BS2)	0.0 - 0.1	nd	nd	nd	nd	140	2,000	500	21	520	Yes	2,600	WFO
2017	BB-TP50-BS2	0.25 - 0.50	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS19	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	27	27	Yes	27	PLO. ULO
2018	2018-SS63 (Fld-Dup of 2018-SS19)	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	30	30	Yes	30	ULO
2018	2018-SS20	0.0 - 0.2	nd	0.043	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS64 (Fld-Dup of 2018-SS20)	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS21	0.0 - 0.2	nd	0.072	nd	nd	nd	nd	nd	26	26	Yes	26	ULO
2018	2018-SS65 (Fld-Dup of 2018-SS21)	0.0 - 0.2	nd	0.044	nd	nd	nd	nd	nd	20	20	Yes	20	ULO
2018	2018-MW33-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW34-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW37-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW38-GP02	0.9 - 1.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW38-GP08	6.3 - 7.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW39-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW39-GP03	1.8 - 2.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW40-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW41-GP01	0.0 - 0.9	nd	0.051	nd	0.082	-	-			-	No	-	G/FO. LO
2018	2018-MW41-GP06	4.5 - 5.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW49-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH35-GP06	4.5 - 5.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH35-GP06 Lab-Dup	-	-	-	-	-	nd	nd	nd	nd	nd	-	-	-
2018	2018-BH36-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Former Innu Camp														
2018	2018-SS26	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS26 Lab-Dup	-	nd	nd	nd	nd	nd	-			-	-	-	-
2018	2018-SS27	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS28	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS28 Lab-Dup	-	-	-	-	-	-	nd	nd	nd	nd	-	-	-
2018	2018-SS67 (Fld-Dup of 2018-SS28)	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS29	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW46-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
General Dump Site														
2018	2018-SS22	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS66 (Fld-Dup of 2018-SS22)	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS23	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS24	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS25	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH44-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-BH45-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	24	24	Yes	24	ULO
2018	2018-MW42-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW43-GP01	0.0 - 0.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-MW43-GP07	5.4 - 6.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.

2 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil / lube oil impacts (July 2012, revised January 2015).

4 = Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

5 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
"-" = not analyzed, not applicable or no applicable guideline.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
Underlined = Value exceeds Tier I ESLs - Plants and Soil Invertebrates (surface soil only).
Bold = Value exceeds Tier I ESLs - Wildlife and Livestock (surface soil only).
Shaded = Value exceeds Tier I RBSLs.

Resemblance:

PLO = Possible lube oil fraction.
LO = Lube oil fraction / One product in lube oil range.
ULO = Unidentified compound(s) in lube oil range.
WFO = Weathered fuel oil fraction.
FO = Fuel oil fraction / One product in the fuel oil range.
FO/LO = One product in fuel/lube oil range.
G = One product in the gasoline range.
G/FO = One product in gas/fuel oil range.

Table F.1 Results of Laboratory Analysis of Petroleum Hydrocarbons in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)							Resemblance
			Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	>C_{16}-<C_{21}	>C_{21}-<C_{32}	F3 (C_{16}-C_{32})	Returned to baseline?[4]	Modified TPH[5]	
	RDL		0.025	0.025	0.025	0.050	2.5	10	10	15	25	-	15	-
	Tier I ESLs - Plants and Soil Inv.[1]		180	250	300	350	320	260			1,700	-	-	-
	Tier I ESLs - Wildlife and Livestock[2]		18	980	640	2,600	11,000	9,800			16,000	-	-	-
	Tier I RBSLs[3]		2.5	10,000	10,000	110	-	-			-	-	870/4,000/ 10,000	-
Upper Site														
2017	BB-SS43	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2017	BB-SS44	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	38	38	Yes	38	ULO. PLO
2017	BB-SS45	0.0 - 0.1	nd	nd	nd	nd	nd	nd	36	580	620	No	620	LO
2017	BB-SS46	0.0 - 0.1	nd	nd	nd	nd	nd	790	2,100	28,000	**30,000**	No	31,000	FO. LO
2017	BB-SS47	0.0 - 0.1	nd	nd	nd	nd	nd	nd	nd	45	45	Yes	45	ULO. PLO
2017	BB-SS48	0.0 - 0.1	nd	0.035	nd	0.10	3.4	150	77	20	97	Yes	250	WFO
2017	BB-TP39-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	24	180	200	No	200	LO
2017	BB-TP41-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	20	20	Yes	20	PLO
2017	BB-TP42-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	36	36	Yes	36	PLO
2017	BB-TP43-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	33	33	Yes	33	PLO
2017	BB-TP44-BS1	0.0 - 0.25	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS30	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	140	140	Yes	140	LO
2018	2018-SS31	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	120	120	Yes	120	LO
2018	2018-SS32	0.0 - 0.2	nd	nd	nd	nd	nd	30	360	4500	4,900	No	4,900	LO
2018	2018-SS33	0.0 - 0.2	nd	nd	nd	nd	nd	13	160	310	470	Yes	480	FO/LO
2018	2018-SS34	0.0 - 0.2	nd	nd	nd	nd	nd	37	86	62	150	Yes	190	FO. PLO
2018	2018-SS35	0.0 - 0.2	nd	nd	nd	nd	nd	350	1600	16000	**18,000**	No	18,000	LO
2018	2018-SS35 Lab-Dup	-	nd	nd	nd	nd	nd	-	-	-	-	-	-	-
2018	2018-SS36	0.0 - 0.2	nd	nd	nd	nd	nd	82	93	730	820	Yes	900	FO. LO
2018	2018-SS37	0.0 - 0.2	nd	nd	nd	nd	-	-	-	-	-	No	-	LO
2018	2018-SS38	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	47	47	Yes	47	ULO
2018	2018-SS39	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS40	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	46	46	Yes	46	ULO
2018	2018-SS40 Lab-Dup	-	-	-	-	-	-	nd	nd	nd	48	-	-	-
2018	2018-SS41	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS42	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	300	300	Yes	300	LO
2018	2018-SS43	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS44	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	52	52	Yes	52	ULO. PLO
2018	2018-SS45	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	54	54	Yes	54	ULO. PLO
2018	2018-SS46	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SS47	0.0 - 0.2	nd	nd	nd	nd	nd	nd	12	170	180	Yes	190	LO
2018	2018-SS48	0.0 - 0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.

2 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil / lube oil impacts (July 2012, revised January 2015).

4 = Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

5 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

"-" = not analyzed, not applicable or no applicable guideline.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

Underlined = Value exceeds Tier I ESLs - Plants and Soil Invertebrates (surface soil only).

Bold = Value exceeds Tier I ESLs - Wildlife and Livestock (surface soil only).

Shaded = Value exceeds Tier I RBSLs.

Resemblance:

PLO = Possible lube oil fraction.
LO = Lube oil fraction / One product in lube oil range.
ULO = Unidentified compound(s) in lube oil range.
WFO = Weathered fuel oil fraction.
FO = Fuel oil fraction / One product in the fuel oil range.
FO/LO = One product in fuel/lube oil range.
G = One product in the gasoline range.
G/FO = One product in gas/fuel oil range.

Table F.2 Results of Laboratory Analysis of Petroleum Hydrocarbon Fractionation in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Tier I ESLs - Plants and Soil Inv. [1]	Tier I ESLs - Wildlife and Livestock [2]	Tier I RBSLs [3]	Camp / Antenna Areas and AES Compound					Waste Disposal Sites		Upper Site	
						2017		2018			2017	2018	2017	2018
						BB-SS38	BB-SS38 Lab-Dup	2018-MW32-GP09	2018-MW32-GP09 Lab-Dup	2018-MW18-GP06	BB-TP8-BS1	2018-MW41-GP01	BB-TP40-BS1	2018-SS37
Sample Depth:						0.0 - 0.1	-	7.2 - 8.1	-	4.5 - 5.4	0.0 - 0.25	0.0 - 0.9	0.0 - 0.25	0.0 - 0.2
Benzene	0.025	mg/kg	180	18	2.5	nd	-	nd	-	nd	nd	nd	nd	nd
Toluene	0.025	mg/kg	250	980	10,000	nd	-	nd	-	nd	nd	0.051	nd	nd
Ethylbenzene	0.025	mg/kg	300	640	10,000	nd	-	nd	-	nd	nd	nd	nd	nd
Xylenes	0.05	mg/kg	350	2,600	110	nd	-	2.0	-	0.32	nd	0.082	nd	nd
Modified TPH - Tier I [4]	15	mg/kg	-	-	870/4,000/ 10,000	1,100	-	5,300	-	3,300	1,700	4,200	81	17,000
> C_8-C_{10} Aromatic	0.1	mg/kg	-	-	-	nd	-	27	-	21	nd	6.2	nd	nd
> C_{10}-C_{12} Aromatic	4.0	mg/kg	-	-	-	nd (20)	nd (20)	310	200	190	nd (20)	55	nd (20)	40
> C_{12}-C_{16} Aromatic	15	mg/kg	-	-	-	92	110	700	470	360	23	23	nd	110
> C_{16}-C_{21} Aromatic	15	mg/kg	-	-	-	56	66	120	88	110	99	39	nd	320
> C_{21}-C_{32} Aromatic	15	mg/kg	-	-	-	31	35	140	110	32	450	360	50	3,300
> C_6-C_8 Aliphatic	1.0	mg/kg	-	-	-	nd	-	6.2	-	3.1	nd	nd	nd	nd
> C_8-C_{10} Aliphatic	1.0	mg/kg	-	-	-	nd	-	380	-	270	nd	730	nd	nd
> C_{10}-C_{12} Aliphatic	8.0	mg/kg	-	-	-	22	24	1,200	1,000	800	nd	510	nd	nd
> C_{12}-C_{16} Aliphatic	15	mg/kg	-	-	-	700	800	1,900	1,700	1,200	76	38	nd	130
> C_{16}-C_{21} Aliphatic	15	mg/kg	-	-	-	170	190	170	200	240	220	290	nd	930
> C_{21}-C_{32} Aliphatic	15	mg/kg	-	-	-	65	68	450	490	38	860	2,200	31	12,000
F1 (C_6-C_{10})	-	mg/kg	320	11,000	-	nd	-	410	-	290	nd	740	nd	nd
F2 (C_{10}-C_{16})	-	mg/kg	260	9,800	-	810	930	4,100	-	2,600	99	nd	nd	280
F3 (C_{16}-C_{32})	-	mg/kg	1,700	16,000	-	320	360	880	-	420	1,600	2,900	81	**17,000**
Returned to Baseline? [5]						Yes	-	No	-	Yes	No	No	Yes	No
Resemblance						WFO	-	FO. LO	-	FO	FO/LO. LO	G/FO. LO	ULO. PLO	LO

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.

2 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater, coarse grained soil, and gasoline/fuel oil / lube oil impacts (July 2012, revised January 2015).

4 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX)

5 = Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd (#) = Not detected above elevated RDL shown.
nd = Not detected above standard RDL.
"-" = not analyzed, not applicable or no applicable guideline.
Underlined = Value exceeds Tier I ESLs - Plants and Soil Invertebrates (surface soil only).
Bold = Value exceeds Tier I ESLs - Wildlife and Livestock (surface soil only).
Shaded = Value exceeds Tier I RBSLs .

Resemblance:

WFO = Weathered fuel oil fraction.
FO/LO = One product in fuel/lube oil range.
LO = Lube oil fraction.
ULO = Unidentified compounds in lube oil range.
PLO = Possible lube oil fraction.
G/FO = One product in gas/fuel oil range.

Table F.3 Results of Laboratory Analysis of MTBE in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Sample ID		Sample Depth (m)	Methyl t-butyl ether (MTBE)
		RDL	0.025
		Units	mg/kg
		Guideline	0.57 [1]
Lower Site - General Area			
2017	BB-SS1	0.0 - 0.1	nd
	BB-SS3	0.0 - 0.1	nd
	BB-SS8	0.0 - 0.1	nd
	BB-SS10	0.0 - 0.1	nd
Camp / Antenna Areas and AES Compound			
2017	BB-SS38	0.0 - 0.1	nd
	BB-TP26-BS1	0.0 - 0.25	nd
	BB-TP28-BS1	0.0 - 0.25	nd
	BB-TP28-BS1 Lab-Dup	-	nd
Unknown Foundation / Building			
2017	BB-TP36-BS1	0.0 - 0.25	nd
Waste Disposal Sites			
2017	BB-SS17	0.0 - 0.1	nd
	BB-SS23	0.0 - 0.1	nd
	BB-TP3-BS1	0.0 - 0.25	nd
	BB-TP10-BS2	0.25 - 0.50	nd
	BB-TP101-BS2	0.25 - 0.50	nd
	BB-TP13-BS1	0.0 - 0.25	nd
	BB-TP14-BS1	0.0 - 0.25	nd
Upper Site			
2017	BB-TP39-BS1	0.0 - 0.25	nd
	BB-TP42-BS1	0.0 - 0.25	nd
	BB-TP44-BS1	0.0 - 0.25	nd

Notes:

1 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) (Assuming non-potable groundwater).

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

Table F.4 Results of Laboratory Analysis of VOCs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Volatile Organics	RDL	Units	Guideline	Lower Site - General Area				Camp / Antenna Areas and AES Compound					Unknown Foundation / Building	Waste Disposal Site							Upper Site		
				2017				2017					2017	2017							2017		
				BB-SS1	BB-SS3	BB-SS8	BB-SS10	BB-SS38	BB-TP26-BS1	BB-TP28-BS1	BB-TP28-BS1 Lab-Dup	BB-TP33-BS2	BB-TP36-BS1	BB-SS17	BB-SS23	BB-TP3-BS1	BB-TP10-BS2	BB-TP101-BS2 (Fld Dup of BB-TP10-BS2)	BB-TP13-BS1	BB-TP14-BS1	BB-TP39-BS1	BB-TP42-BS1	BB-TP44-BS1
			Sample depth (m)	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	-	0.25 - 0.50	0.0 - 0.25	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
1,1,1-Trichloroethane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethylene	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	25	µg/kg	10,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	25	µg/kg	10,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	25	µg/kg	10,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzene	25	µg/kg	2,500[2], 180,000[3], 18,000[4]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromodichloromethane	25	µg/kg	18,000 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromoform	25	µg/kg	610 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromomethane	50	µg/kg	50 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carbon Tetrachloride	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	25	µg/kg	10,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroethane	200	µg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethylene	25	µg/kg	55,000 [5]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	25	µg/kg	180 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibromochloromethane	25	µg/kg	2,500 [5]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	25	µg/kg	10,000,000[2], 300,000[3], 640,000[4]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylene Dibromide	25	µg/kg	50 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methylene Chloride (Dichloromethane)	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (50)	nd	nd	nd (50)	nd	nd (50)
o-Xylene	25	µg/kg	110,000[2], 350,000[3], 2,600,000[4]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
p+m-Xylene	25	µg/kg		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Styrene	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethylene (PCE)	25	µg/kg	600 [5]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Toluene	25	µg/kg	10,000,000[2], 250,000[3], 980,000[4]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethylene	25	µg/kg	50,000 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	25	µg/kg	180 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethylene (TCE)	10	µg/kg	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane (FREON 11)	25	µg/kg	32,000 [6]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl Chloride	20	µg/kg	4.3 [5]	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for comercial land use (1999 and Updates).
2 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation Tier I Risk-Based Screening Levels (RBSLs) (Table 4a) for a commercial site with non-potable groundwater (July 2012, revised January 2015).
3 = Atlantic Partnership in RBCA Implementation (PIRI) Tier I Soil Ecological Screening Levels (ESLs) for the Protection of Plants and Soil Invertebrates; Direct Soil Contact (Table 1a), for a commercial site with coarse grained soil (July 2012, revised January 2015). Screening levels apply to the top 1.5 m of the soil profile.
4 = Atlantic Partnership in RBCA Implementation Tier I Soil ESLs for the Protection of Wildlife (mammals and birds) and Livestock; Soil and food ingestion (Table 1b), for an agricultural site with coarse grained soil (July 2012, revised January 2015). Note: guidelines only exist for agricultural land use. Screening levels apply to the top 1.5 m of the soil profile.
5 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Comercial Land Use - All Exposure Pathways (2016) (assuming non-potable groundwater).
6 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd (#) = Not detected above elevated RDL shown.
nd = not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.
Underlined/Italicized = RDL exceeds the applicable guideline.

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Lower Site - General Area							Camp / Antenna Areas and AES Compound				
						2017					2018		2017				
						BB-SS1	BB-SS3	BB-SS8	BB-SS10	BB-SS10 Lab-Dup	2018-MW47-GP02	2018-MW47-GP06	BB-SS24	BB-SS26	BB-SS27	BB-SS28	BB-SS30
Sample Depth (m):						0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	-	0.9 - 1.8	4.5 - 5.4	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1
Non-Carcinogenic PAHs																	
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd (0.090)	nd	nd (0.15)	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd (0.17)	nd	nd (0.32)	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd	nd	nd	nd	nd (0.060)	nd	nd (0.12)	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd	nd (0.050)	nd	nd (0.090)	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.020)	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd	nd	nd	nd (0.090)	nd	nd (0.20)	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	nd	*nd (0.040)*	nd	*nd (0.21)*	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	nd	nd	nd	0.016	nd	0.016	nd	nd
Carcinogenic PAHs																	
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Camp / Antenna Areas and AES Compound										
						2017									2018	
						BB-SS301 (Fld Dup of BB-SS30)	BB-SS31	BB-SS31 Lab-Dup	BB-SS32	BB-SS35	BB-SS36	BB-SS40	BB-TP17-BS1	BB-TP35-BS1	2018-SS01	2018-SS02
Sample Depth (m):						0.0 - 0.1	0.0 - 0.1	-	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.1	0.0 - 0.1
Non-Carcinogenic PAHs																
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd (0.030)	nd (0.12)	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd (0.050)	nd (0.32)	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd	nd	nd	nd (0.050)	0.26	nd	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd (0.050)	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd (0.040)	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	0.017	nd	nd	nd	0.012	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd	nd	nd	nd (0.11)	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	0.027	0.023	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	0.015	nd	nd	0.015	0.028	nd	nd (0.02)	nd
Carcinogenic PAHs																
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	0.012	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Camp / Antenna Areas and AES Compound											
						2018											
						2018-BH03-GP01	2018-BH03-GP07	2018-BH04-GP05	2018-BH07-GP01	2018-BH07-GP01 Lab-Dup	2018-BH10-GP02	2018-BH13-GP07	2018-BH15-GP01	2018-BH28-GP02	2018-BH29-GP01	2018-MW01-GP03	2018-MW02-GP01
Sample Depth (m):						0.0 - 0.9	5.4 - 6.3	3.6 - 4.5	0.0 - 0.9	-	0.9 - 1.8	5.4 - 6.3	0.0 - 0.9	0.9 - 1.8	0.0 - 0.9	1.8 - 2.7	0.0 - 0.9
Non-Carcinogenic PAHs																	
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	1.1	nd	nd	nd	nd	nd	0.65	nd	nd	nd (0.09)
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	1.5	nd	nd	nd	nd	nd	0.71	0.021	nd	nd (0.22)
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd (0.03)	nd	nd	nd	nd	nd	nd (0.06)	nd	nd	*nd (0.47)*
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd (0.05)	nd	nd	nd	nd	nd	nd (0.08)	nd	nd	nd (0.07)
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	0.091	nd	nd	nd	nd	nd	nd (0.02)	nd	nd	nd (0.15)
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	0.38	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.15)*
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	0.037	nd	nd	nd	nd	nd	0.088	nd	nd	nd (0.02)
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																	
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Camp / Antenna Areas and AES Compound												
						2018												
						2018-MW06-GP01	2018-MW14-GP01	2018-MW14-GP07	2018-MW17-GP03	2018-MW21-GP01	2018-MW27-GP07	2018-MW32-GP01	2018-MW50-GP04	2018-SS07	2018-SS13	2018-SS61 (Fld Dup of 2018-SS13)	2018-SS15	2018-SS18
Sample Depth (m):						0.0 - 0.9	0.0 - 0.9	5.4 - 6.3	1.8 - 2.7	0.0 - 0.9	5.4 - 6.3	0.0 - 0.9	2.7 - 3.6	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
Non-Carcinogenic PAHs																		
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	0.047	0.13	nd	0.25	nd(0.04)	0.21	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	0.047	0.07	nd	0.04	0.018	0.16	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd (0.16)	nd	nd	0.15	nd (0.15)	nd	nd	nd (0.02)	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd (0.08)	nd	nd	nd (0.08)	nd (0.1)	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	0.059	nd	nd	nd (0.06)	0.15	nd	nd	nd (0.02)	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	*nd (0.04)*	*nd (0.03)*	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	0.088	nd	nd (0.02)	nd	0.097	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																		
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Unknown Foundation / Building			Waste Disposal Sites								
						2017		2018	2017								
						BB-TP36-BS1	BB-TP36-BS1 Lab-Dup	2018-AP2-BS1	BB-SS13	BB-SS15	BB-SS17	BB-SS23	BB-TP10-BS2	BB-TP101-BS2 (Fld Dup of BB-TP10-BS2)	BB-TP12-BS1	BB-TP13-BS2	BB-TP14-BS1
Sample Depth (m):						0.0 - 0.25	-	0.0 - 0.6	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.25 - 0.50	0.0 - 0.25
Non-Carcinogenic PAHs																	
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																	
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Waste Disposal Sites												
						2017				2018								
						BB-TP15-BS1	BB-TP15-BS2	BB-TP151-BS2 (Fld Dup of BB-TP15-BS2)	BB-TP16-BS1	2018-SS19	2018-SS63 (Fld Dup of 2018-SS19)	2018-SS20	2018-SS64 (Fld Dup of 2018-SS20)	2018-SS64 Lab-Dup	2018-SS21	2018-SS65 (Fld Dup of 2018-SS21)	2018-BH36-GP01	2018-MW33-GP01
Sample Depth (m):						0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	-	0.0 - 0.2	0.0 - 0.2	0.0 - 0.9	0.0 - 0.9
Non-Carcinogenic PAHs																		
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	0.012	nd	nd	nd (0.21)	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	0.023	nd	nd	nd (0.50)	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd (0.070)	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.02)
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd (0.16)	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd (0.020)	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	0.025	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	*nd (1.0)*	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	0.11	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	0.55	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	0.016	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																		
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Waste Disposal Sites					General Dump Site						
						2018					2018						
						2018-MW34-GP02	2018-MW37-GP03	2018-MW38-GP01	2018-MW39-GP02	2018-MW41-GP02	2018-SS22	2018-SS66 (Fld Dup of 2018-SS22)	2018-SS24	2018-BH44-GP06	2018-BH45-GP01	2018-MW42-GP02	2018-MW43-GP07
Sample Depth (m):						0.9 - 1.8	1.8 - 2.7	0.0 - 0.9	0.9 - 1.8	0.9 - 1.8	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	4.5 - 5.4	0.0 - 0.9	0.9 - 1.8	5.4 - 6.3
Non-Carcinogenic PAHs																	
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	0.25	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	0.3	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd (0.02)	nd (0.02)	nd (0.02)	nd (0.02)	0.017	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	*nd (0.04)*	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																	
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Former Innu Camp			Upper Site								
						2018			2017								2018
						2018-SS26	2018-SS28	2018-SS67 (Fld Dup of 2018-SS28)	BB-SS43	BB-SS46	BB-SS48	BB-SS49	BB-SS50	BB-TP39-BS1	BB-TP41-BS1	BB-TP43-BS1	2018-SS30
Sample Depth (m):						0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.2
Non-Carcinogenic PAHs																	
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd (0.050)	0.018	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd	nd	nd	nd	nd (0.020)	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	0.045	nd	nd	nd	nd	0.012	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd (0.040)	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	nd	nd	0.21	nd	nd	nd	nd	nd	nd	nd
Carcinogenic PAHs																	
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	0.019	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	nd	nd	0.14	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.5 Results of Laboratory Analysis of PAHs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	B(a)P PEF	HH Guidelines	CCME CSQG$_{EH}$	Upper Site							
						2018							
						2018-SS32	2018-SS34	2018-SS37	2018-SS38	2018-SS39	2018-SS40	2018-SS41	2018-SS49
					Sample Depth (m):	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.1
Non-Carcinogenic PAHs													
1-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.010	mg/kg	-	160 [3]	-	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	mg/kg	-	43,000 [2]	0.28 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.010	mg/kg	-	6.6 [3]	320 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	mg/kg	-	37,000 [2]	32 [1]	nd (0.02)	nd	nd (0.02)	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	-	5,300 [2]	180 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	-	4,100 [2]	0.25 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	-	25 [2]	0.013 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	-	-	0.046 [1]	nd	nd	*nd (0.05)*	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	-	3,200 [2]	100 [1]	nd	nd	0.023	nd	nd	nd	nd	nd
Carcinogenic PAHs													
Benzo(a)anthracene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	1	-	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.01	-	13 [3]	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	mg/kg	0.1	-	-	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	mg/kg	0.01	-	14 [3]	nd	nd	0.073	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.1	-	10 [1]	nd	nd	nd	nd	nd	nd	nd	nd
B(a)P TPE			-	5.3 [1,4]	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and Updates).

2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways (2016) assuming non-potable groundwater.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).

4 = Carcinogenic PAHs assessed as B[a]P TPE for Human Health.
Based on CCME guidelines for ingestion, inhalation and dermal exposures. Where a parameter is not detected, 1/2 of the RDL is used in the TPE calculation. Values were not multiplied by a factor of 3, as there was no evidence of creosote treated wood on the property.

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

B(a)P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

RDL = Reportable Detection Limit; nd = Not detected above standard RDL;

nd (#) = Not detected above elevated RDL shown.

nd = Not detected above standard RDL.

"-" = Not applicable or no applicable guideline.

Bold = Value exceeds the Human Health guideline

Shaded = Value exceed the Ecological guideline

Underlined/Italicized = RDL exceeds the Human Health or Ecological guideline

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area							Camp / Antenna Areas and AES Compound							
				2017				2018			2017							
				BB-SS1	BB-SS3	BB-SS8	BB-SS10	2018-MW47-GP01	2018-MW48-GP02	2018-MW48-GP06	BB-SS30	BB-SS301 (Fld Dup of BB-SS30)	BB-TP17-BS1	BB-TP18-BS1	BB-TP19-BS1	BB-TP19-BS1 Lab-Dup	BB-TP19-BS1 Lab-Dup 2	BB-TP20-BS1	BB-TP20-BS2
			Sample Depth (m):	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.9	0.9 - 1.8	4.5 - 5.4	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	-	0.0 - 0.1	0.0 - 0.25	0.25 - 0.50
Aluminum	10	mg/kg	-	7,600	5,800	8,500	7,500	3,600	3,600	2,800	3,600	3,400	6,700	3,800	4,000	5,000	-	4,300	4,200
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	19	*2.1*	*nd*	nd	3.9
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Barium	5.0	mg/kg	2000 [1]	32	32	28	21	39	27	34	31	42	38	35	81	100	-	220	200
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.2	1.6	-	nd	nd
Chromium	2.0	mg/kg	87 [1]	13	5.9	6.6	6.8	3.1	3.9	5.9	5.0	4.6	7.2	4.1	4.4	*8.8*	7.9	4.9	5.0
Cobalt	1.0	mg/kg	300 [1]	3.6	2.1	1.9	1.6	2.0	1.8	1.5	2.3	2.3	2.4	1.5	2.4	2.5	-	2.0	2.1
Copper	2.0	mg/kg	91 [1]	6.6	3.8	4.0	2.9	4.9	3.6	4.4	18	5.3	5.8	4.1	9.6	13	-	10	7.9
Iron	50	mg/kg	-	17,000	12,000	14,000	14,000	9,700	9,700	8,600	9,600	9,400	12,000	8,900	8,100	11,000	-	10,000	10,000
Lead	0.5	mg/kg	600 [1]	14	5.8	7.8	7.5	6.6	5.7	4.0	7.6	6.4	12	7.9	25	*48*	*41*	18	18
Lithium	2.00	mg/kg	-	11	9.0	8.2	8.7	11	10	8.5	8.3	7.6	12	7.4	8.0	9.3	-	9.2	9.3
Manganese	2.00	mg/kg	-	160	99	100	100	130	110	100	110	110	120	86	90	110	-	100	110
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Nickel	2.0	mg/kg	89 [1]	5.2	4.0	3.2	2.5	2.5	2.4	2.7	6.2	3.4	3.4	2.1	3.2	3.9	-	3.9	3.2
Rubidium	2.0	mg/kg	-	5.5	7.1	4.7	3.5	5.7	5.1	4.7	4.4	4.9	6.3	4.5	4.2	4.6	-	5.3	5.5
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Strontium	5.0	mg/kg	-	7.4	nd	5.2	5.2	6.1	nd	nd	nd	nd	6.3	nd	5.9	7.0	-	7.6	5.9
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.83	0.47	0.61	0.67	0.7	0.66	0.82	0.59	0.59	0.71	0.48	0.41	0.5	-	0.63	0.54
Vanadium	2.0	mg/kg	130 [1]	23	13	15	15	6.9	6.9	6.8	7.3	8.3	13	8.5	6.4	*12*	*11*	9.3	8.5
Zinc	5.0	mg/kg	360 [1]	34	22	23	24	32	26	27	89	27	53	25	94	120	-	110	73

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

Shaded = Value exceeds applicable guideline

Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Camp / Antenna Areas and AES Compound															
				2017															
				BB-TP201-BS2 (Fld Dup of BB-TP20-BS2)	BB-TP21-BS1	BB-TP22-BS1	BB-TP22-BS2	BB-TP221-BS2 (Fld Dup of BB-TP22-BS2)	BB-TP23-BS1	BB-TP24-BS1	BB-TP25-BS1	BB-TP26-BS1	BB-TP27-BS1	BB-TP28-BS1	BB-TP30-BS1	BB-TP31-BS1	BB-TP32-BS1	BB-TP33-BS1	BB-TP34-BS1
			Sample Depth (m):	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
Aluminum	10	mg/kg	-	3,800	5,400	4,900	4,400	5,300	7,900	5,600	4,900	4,600	4,800	4,300	5,300	3,000	6,000	5,200	8,900
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	2.0	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	45	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	180	69	41	30	43	28	31	32	36	52	37	38	44	130	22	28
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.6	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	4.8	8.4	5.1	7.1	6.2	9.3	5.7	4.3	6.6	6.5	4.7	8.4	3.9	7.0	5.0	7.5
Cobalt	1.0	mg/kg	300 [1]	2.1	3.4	3.3	2.6	2.6	3.5	2.1	2.1	2.4	2.7	2.5	3.2	1.7	2.4	1.3	2.6
Copper	2.0	mg/kg	91 [1]	6.6	9.9	12	5.8	6.2	9.1	5.1	7.7	70	19	7.5	11	5.4	5.7	3.3	4.4
Iron	50	mg/kg	-	9,900	14,000	12,000	10,000	12,000	16,000	11,000	11,000	11,000	12,000	11,000	12,000	8,800	13,000	11,000	15,000
Lead	0.5	mg/kg	600 [1]	17	6.4	80	31	25	14	11	14	41	9.4	6.4	8.4	12	8.5	6.1	8.4
Lithium	2.00	mg/kg	-	9.0	11	9.9	8.4	9.7	10	8.4	9.9	9.4	9.8	10	9.4	7.2	9.3	8.3	9.4
Manganese	2.00	mg/kg	-	100	160	130	120	140	150	100	110	120	120	130	140	92	130	74	140
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	2.8	5.7	5.3	4.0	3.4	5.0	3.6	2.8	3.7	3.9	3.8	6.3	2.7	3.6	2.4	4.1
Rubidium	2.0	mg/kg	-	4.6	9.3	5.6	4.2	6.3	4.5	4.7	5.2	5.9	6.4	5.9	5.5	6.3	5.3	4.6	5.5
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	5.9	10	nd	nd	6.4	6.6	6.6	6.2	6.6	5.8	5.3	7.5	6.0	6.8	nd	5.7
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	33	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.52	1.1	0.61	0.59	0.61	0.77	0.51	0.7	0.49	0.67	0.64	0.64	0.58	0.7	0.41	0.59
Vanadium	2.0	mg/kg	130 [1]	9.1	16	9.4	11	13	25	11	8.1	10	11	9.1	13	8.3	14	11	17
Zinc	5.0	mg/kg	360 [1]	64	62	100	43	50	45	42	93	900	31	31	91	43	33	30	28

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

Shaded = Value exceeds applicable guideline

Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Camp / Antenna Areas and AES Compound															
				2017	2018														
				BB-TP35-BS1	2018-SS06	2018-SS09	2018-SS09 Lab-Dup	2018-SS60 (Fld Dup of 2018-SS09)	2018-SS10	2018-SS11	2018-SS14	2018-SS62 (Fld Dup of 2018-SS14)	2018-SS18	2018-BH03-GP02	2018-BH10-GP01	2018-BH12-GP02	2018-BH64-GP02 (Fld Dup of 2018-BH12-GP02)	2018-BH24-GP01	2018-MW01-GP01
			Sample Depth (m):	0.0 - 0.25	0.0 - 0.2	0.0 - 0.2	-	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.9 - 1.8	0.0 - 0.9	0.9 - 1.8	0.9 - 1.8	0.0 - 0.9	0.0 - 0.9
Aluminum	10	mg/kg	-	7,200	4,700	6,000	5,500	5,500	5,700	5,000	7,000	6,100	5,700	3,400	4,700	3,800	5,000	5,400	3,500
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	5.0	12	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	4.8	3	nd	nd	nd	nd	9.4	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	20	33	36	41	35	55	45	30	33	71	64	50	47	57	29	36
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	0.52	0.46	0.65	0.95	0.45	nd	nd	0.48	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	4.1	5.9	8.6	5.8	6.1	15	9.8	8.6	7.4	8.2	3.6	6.8	4.0	9.3	5.6	3.5
Cobalt	1.0	mg/kg	300 [1]	1.7	2.5	2.3	2.4	2.5	3.9	3.2	2.0	1.9	2.4	2.9	2.8	2.7	4.0	2.2	1.8
Copper	2.0	mg/kg	91 [1]	2.7	5.3	5.5	5.4	6.4	18	610	7.0	8.2	9.2	7.7	12	7.2	8.6	4.3	4.5
Iron	50	mg/kg	-	11,000	11,000	12,000	12,000	12,000	15,000	11,000	14,000	12,000	13,000	9,300	12,000	11,000	15,000	11,000	8,600
Lead	0.5	mg/kg	600 [1]	6.4	7.7	24	*16*	16	180	180	17	20	94	5.0	7.3	5.8	6.6	12	4.6
Lithium	2.00	mg/kg	-	9.9	9.2	10	9.4	9.9	10	10	8.4	8.1	8.8	8.6	12	9.7	12	7.2	8.5
Manganese	2.00	mg/kg	-	90	120	120	110	120	150	130	110	95	110	110	130	130	170	110	94
Mercury	0.1	mg/kg	50 [1]	nd	nd	0.16	0.16	0.23	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	2.5	3.4	3.3	3.3	4.2	11	4.4	3.4	2.9	3.8	4.4	4.3	3.7	5.6	3.0	2.9
Rubidium	2.0	mg/kg	-	5.4	6.0	7.2	6.7	5.2	6.1	5.9	4.8	5.3	5.2	6.0	8.1	8.1	8.2	4.6	5.0
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	nd	6.2	14	15	15	40	22	6.5	6.3	6.6	nd	7.7	5.4	7.9	5.2	nd
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	2.2	3.0	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.38	0.71	0.63	0.67	0.62	0.67	0.61	0.54	0.53	0.62	0.83	0.88	0.67	0.72	0.53	0.59
Vanadium	2.0	mg/kg	130 [1]	9.4	12	14	12	12	25	14	15	13	14	7.1	14	8.1	14	12	7.9
Zinc	5.0	mg/kg	360 [1]	24	31	44	42	47	93	120	43	38	360	28	34	30	40	25	22

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

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Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Camp / Antenna Areas and AES Compound										Unknown Foundation / Building					Waste Disposal Sites	
				2018										2017			2018		2017	
				2018-MW01-GP01 Lab-Dup	2018-MW01-GP01 Lab-Dup 2	2018-MW06-GP01	2018-MW08-GP01	2018-MW09-GP02	2018-MW11-GP08	2018-MW32-GP02	2018-MW50-GP01	2018-MW53-GP01	2018-MW53-GP01 Lab-Dup	BB-TP36-BS1	BB-TP37-BS1	BB-TP38-BS1	2018-AP1-BS1	2018-SS50	BB-SS13	BB-SS14
			Sample Depth (m):	-	-	0.0 - 0.9	0.0 - 0.9	0.9 - 1.8	6.3 - 7.2	0.9 - 1.8	0.0 - 0.9	0.0 - 0.9	-	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.6	0.0 - 0.2	0.0 - 0.1	0.0 - 0.1
Aluminum	10	mg/kg	-	4,600	-	3,700	5,300	3,400	4,600	3,300	6,700	4,900	3,900	2,500	2,800	4,600	5,500	3,500	5,400	3,300
Antimony	2.0	mg/kg	40 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	45	-	41	55	46	50	47	24	33	28	24	22	18	20	11	37	24
Beryllium	2.0	mg/kg	8 [2]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	6.2	-	5.7	7.2	4.6	9.1	7.3	5.3	6.6	3.6	2.5	nd	3.6	4.4	2.1	6.1	3.0
Cobalt	1.0	mg/kg	300 [1]	2.7	-	2.7	3.0	2.7	3.7	2.7	1.8	2.8	2.4	1.2	nd	1.5	1.5	nd	3.0	2.3
Copper	2.0	mg/kg	91 [1]	5.8	-	5.6	7.2	5.4	7.2	5.6	3.1	5.3	4.4	4.0	nd	2.3	15	nd	8.5	4.3
Iron	50	mg/kg	-	12,000	-	11,000	12,000	9,900	13,000	9,600	10,000	14,000	12,000	7,100	7,100	11,000	10,000	7,300	12,000	7,700
Lead	0.5	mg/kg	600 [1]	5.8	-	4.5	6.2	4.6	7.2	5.8	13	5.3	4.7	5.2	4.4	6.3	6.5	4.0	11	5.4
Lithium	2.00	mg/kg	-	8.8	-	8.1	9.7	8.9	12	7.6	7.1	12	11	7.9	6.7	9.1	8.2	3.3	11	9.1
Manganese	2.00	mg/kg	-	120	-	120	140	130	170	110	83	130	110	84	63	86	97	38	140	100
Mercury	0.1	mg/kg	50 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	4.0	-	4.1	4.6	3.5	4.2	3.4	2.8	4.6	3.7	nd	nd	nd	2.2	nd	4.4	2.8
Rubidium	2.0	mg/kg	-	6.3	-	5.8	7.7	6.3	7.4	4.9	3.9	4.5	3.8	4.1	3.6	4.2	4.6	3.8	5.9	3.9
Selenium	1.0	mg/kg	2.9 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	6.3	-	nd	7.3	nd	nd	nd	nd	5.2	nd	nd	nd	nd	nd	nd	5.8	nd
Thallium	0.1	mg/kg	1 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.67	-	0.64	0.98	0.53	0.75	0.61	0.54	0.53	0.53	0.8	0.5	0.65	0.53	0.22	1.0	0.57
Vanadium	2.0	mg/kg	130 [1]	*13*	8.3	13	13	7.9	16	9.8	10	13	10	4.7	4.1	8.4	8.8	6.3	11	5.9
Zinc	5.0	mg/kg	360 [1]	26	-	26	32	28	36	27	22	34	29	22	17	25	40	9.1	41	24

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Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Waste Disposal Sites															
				2017															
				BB-SS15	BB-SS16	BB-SS17	BB-SS17 Lab-Dup	BB-SS18	BB-SS19	BB-SS20	BB-SS21	BB-SS22	BB-SS23	BB-TP3-BS1	BB-TP4-BS1	BB-TP4-BS1 Lab-Dup	BB-TP5-BS1	BB-TP6-BS1	BB-TP7-BS1
			Sample Depth (m):	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	-	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	-	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25
Aluminum	10	mg/kg	-	3,600	3,800	4,400	3,800	5,100	5,400	3,000	4,400	5,400	5,200	7,000	4,800	5,100	4,500	9,100	5,400
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	40	21	32	26	13	27	14	20	17	19	28	22	21	26	48	15
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	4.6	3.6	4.5	3.9	4.3	5.9	3.4	4.3	3.3	4.6	6.9	3.9	5.0	4.4	14	3.7
Cobalt	1.0	mg/kg	300 [1]	1.2	1.2	1.9	1.7	nd	2.1	nd	1.2	1.0	1.1	2.2	1.7	1.7	1.4	5.8	nd
Copper	2.0	mg/kg	91 [1]	4.8	2.8	5.2	4.7	nd	4.2	7.2	2.4	nd	2.1	5.9	15	16	3.1	16	nd
Iron	50	mg/kg	-	7,400	8,100	11,000	8,700	6,700	12,000	5,800	11,000	9,100	9,200	11,000	9,500	10,000	9,500	16,000	9,500
Lead	0.5	mg/kg	600 [1]	14	5.7	8.8	7.1	7.1	11	5.9	7.9	4.4	5.2	8.1	12	15	6.0	9.7	5.1
Lithium	2.00	mg/kg	-	5.4	6.9	11	9.5	3	9.7	2.3	6.6	5.8	5.4	11	9.5	9.2	7.8	14	5.6
Manganese	2.00	mg/kg	-	54	75	110	88	39	120	32	77	75	54	120	82	85	79	210	59
Mercury	0.1	mg/kg	50 [1]	0.29	nd	nd	nd	nd	0.13	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	2.3	nd	2.7	2.7	nd	3.2	2.9	2.2	nd	2.1	3.6	2.6	3.1	2.4	8.6	nd
Rubidium	2.0	mg/kg	-	3.5	4.3	6.3	5.5	2.7	5	4.6	4.8	5.4	3.4	5.2	4.5	4.3	5.1	8.1	3.9
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	5.1	nd	6.1	nd	nd	nd	nd	nd	nd	nd	5.8	nd	nd	nd	8.8	nd
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.39	0.37	0.9	0.62	0.29	0.62	0.27	0.4	0.32	0.34	0.7	0.45	0.52	0.52	0.88	0.3
Vanadium	2.0	mg/kg	130 [1]	7.3	6.6	8.0	7.0	8.2	11	6.6	10	8.9	10	11	7.3	8.7	8.8	22	9.3
Zinc	5.0	mg/kg	360 [1]	23	21	30	29	12	28	56	22	15	16	31	37	44	21	41	15

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

Shaded = Value exceeds applicable guideline

Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Waste Disposal Sites															
				2017											2018				
				BB-TP71-BS1 (Fld Dup of BB-TP7-BS1)	BB-TP8-BS1	BB-TP12-BS1	BB-TP121-BS1 (Fld Dup of BB-TP12-BS1)	BB-TP13-BS1	BB-TP14-BS1	BB-TP15-BS1	BB-TP16-BS1	BB-TP16-BS2	BB-TP161-BS2 (Fld Dup of BB-TP16-BS2)	BB-TP50-BS1	2018-SS20	2018-SS64 (Fld Dup of 2018-	2018-SS21	2018-SS65 (Fld Dup of 2018-	2018-BH35-GP01
			Sample Depth (m):	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.9
Aluminum	10	mg/kg	-	6,100	4,200	4,200	3,900	6,900	3,600	3,200	4,300	4,900	5,100	4,900	5,600	6,200	3,500	5,400	6,700
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	22	82	25	30	19	17	27	18	30	24	20	18	23	21	23	30
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	3.4	6.2	3.8	3.8	4.7	3.2	2.8	3.0	5.0	4.3	3.5	3.6	4.8	2.7	4.0	6.6
Cobalt	1.0	mg/kg	300 [1]	nd	2.0	1.7	1.5	1.5	nd	nd	nd	1.4	1.6	1.4	1.2	1.3	nd	1.1	2.0
Copper	2.0	mg/kg	91 [1]	nd	10	4.3	3.5	2.7	nd	nd	nd	2.9	6.3	3.5	2.0	2.4	nd	nd	3.3
Iron	50	mg/kg	-	8,600	10,000	10,000	8,000	11,000	7,300	7,300	8,600	8,900	8,900	9,900	10,000	11,000	6,400	9,100	13,000
Lead	0.5	mg/kg	600 [1]	5.4	44	6.3	5.4	6.7	5.8	5.8	5.4	15	5.8	6.6	6.1	6.9	5.3	6.1	8.2
Lithium	2.00	mg/kg	-	5.7	8.8	9.1	8.2	9.1	4.2	4.0	4.7	8.6	8.1	6.7	7.6	8.0	3.8	5.8	9.9
Manganese	2.00	mg/kg	-	53	110	110	92	84	37	48	48	83	79	83	74	75	38	57	110
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	nd	3.1	2.4	2.3	2.5	nd	nd	nd	2.3	3.6	5.2	2.1	2.1	nd	nd	3.2
Rubidium	2.0	mg/kg	-	3.8	5.1	4.4	4.6	4.9	3.8	4.5	3.6	3.9	4.3	5.8	4.0	4.1	3.0	3.9	7.1
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	nd	5.6	nd	5.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.4	6.9
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.31	0.52	0.59	0.53	0.46	0.27	0.3	0.27	0.55	0.63	0.39	0.4	0.52	0.24	0.32	0.64
Vanadium	2.0	mg/kg	130 [1]	8.8	9.9	8.2	7.4	11	7.7	6.6	9	7.4	7.6	8.9	9.7	11	6.5	11	14
Zinc	5.0	mg/kg	360 [1]	13	75	24	23	22	15	12	12	21	43	20	18	20	10	15	26

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

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nd = Not detected above standard RDL.

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Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Waste Disposal Sites													Former Innu Camp		
				2018													2018		
				2018-BH36-GP02	2018-BH36-GP02 Lab-Dup	2018-MW33-GP03	2018-MW34-GP01	2018-MW37-GP01	2018-MW38-GP02	2018-MW38-GP02 Lab-Dup	2018-MW39-GP01	2018-MW39-GP03	2018-MW40-GP02	2018-MW41-GP02	2018-MW49-GP01	2018-MW49-GP02	2018-SS26	2018-SS27	2018-SS28
			Sample Depth (m):	0.9 - 1.8	-	1.8 - 2.7	0.0 - 0.9	0.0 - 0.9	0.9 - 1.8	-	0.0 - 0.9	1.8 - 2.7	0.9 - 1.8	0.9 - 1.8	0.0 - 0.9	0.9 - 1.8	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
Aluminum	10	mg/kg	-	5,400	4,800	3,800	3,300	5,400	3,700	3,800	4,000	3,200	4,300	4,800	3,900	3,200	4,700	3,200	5,900
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	90	85	45	22	25	69	72	31	46	83	40	43	53	23	20	29
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	7.8	7.2	3.5	3.3	5.6	4.6	4.4	4.8	2.7	8.6	5.5	6.0	5.0	3.6	2.6	6.8
Cobalt	1.0	mg/kg	300 [1]	3.7	3.4	2.4	1.5	2.0	2.6	2.8	1.9	1.9	4.9	2.0	2.6	2.4	1.8	1.5	2.9
Copper	2.0	mg/kg	91 [1]	8.2	7.2	6.9	3.6	4.5	7.7	7.2	4.5	5.2	9.2	3.8	5.9	4.8	3.2	3.9	6.9
Iron	50	mg/kg	-	14,000	13,000	11,000	9,600	11,000	11,000	11,000	10,000	9,200	15,000	10,000	11,000	10,000	8,400	6,700	12,000
Lead	0.5	mg/kg	600 [1]	7.0	6.8	5.6	5	6.7	5.4	5	5.5	4.9	5.8	5.5	4.6	4.2	6.2	5.2	8.0
Lithium	2.00	mg/kg	-	12	12	11	9.4	10	10	11	11	9.5	10	8.4	8.3	7.6	7.4	8.9	11
Manganese	2.00	mg/kg	-	160	150	190	90	91	130	130	93	140	180	98	120	110	81	85	150
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	6.2	4.7	3.1	nd	3.1	3.6	4.1	3.1	2.4	6.8	2.9	3.9	3.7	3	2.1	4.2
Rubidium	2.0	mg/kg	-	9.3	9.2	5.7	5.3	4.8	7.7	7.6	6.2	5.8	9	4.7	6.4	4.9	4.2	3.5	6.5
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	7.8	7.1	5.2	nd	5.0	6.6	6.4	nd	6.8	9.1	6.2	6.4	6.8	nd	nd	6.7
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.82	0.8	0.85	0.6	0.84	0.9	0.74	0.61	0.77	1.0	0.55	0.92	0.88	0.47	0.53	0.7
Vanadium	2.0	mg/kg	130 [1]	14	9.7	6.6	6.7	12	8.4	8.4	8.9	6.9	19	11	12	11	7.3	5.1	12
Zinc	5.0	mg/kg	360 [1]	38	38	41	27	29	30	31	29	24	38	32	27	24	18	22	30

Notes:

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2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

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Fld-Dup = Field duplicate sample.

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Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Former Innu Camp				General Dump Site									Upper Site		
				2018				2018									2017		
				2018-SS67 (Fld Dup of 2018-)	2018-SS29	2018-MW46-GP01	2018-MW46-GP04	2018-SS22	2018-SS66 (Fld Dup of 2018-)	2018-SS23	2018-SS24	2018-SS25	2018-BH44-GP02	2018-BH45-GP02	2018-MW42-GP01	2018-MW43-GP01	BB-SS43	BB-SS44	BB-SS46
			Sample Depth (m):	0.0 - 0.2	0.0 - 0.2	0.0 - 0.9	2.7 - 3.6	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.9 - 1.8	0.9 - 1.8	0.0 - 0.9	0.0 - 0.9	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1
Aluminum	10	mg/kg	-	5,900	3,800	4,100	3,500	5,700	8,000	6,100	5,500	7,300	3,300	3,900	4,900	7,900	10,000	34,000	6,800
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	22	nd
Arsenic	2.0	mg/kg	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	3.4	nd
Barium	5.0	mg/kg	2000 [1]	29	30	40	58	34	31	32	29	24	54	47	53	29	68	200	350
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4.4	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	190	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	61	nd
Chromium	2.0	mg/kg	87 [1]	5.2	3.7	5.4	4.3	10	8.6	6.9	5.2	9.5	3.6	5.0	7.0	8.5	24	190	26
Cobalt	1.0	mg/kg	300 [1]	2.6	2.1	2.8	2.5	3.6	3.5	2.5	2.2	2.0	2.3	2.6	3.1	3.0	4.5	13	3.9
Copper	2.0	mg/kg	91 [1]	5.3	6.6	5.3	5.9	56	11	3.8	4.6	9.1	6.9	6.8	7.2	5.4	8.8	6,900	9.6
Iron	50	mg/kg	-	11,000	8,900	12,000	9,900	17,000	17,000	13,000	10,000	15,000	10,000	9,700	11,000	13,000	18,000	43,000	15,000
Lead	0.5	mg/kg	600 [1]	8.4	6.1	5.4	4.3	8.7	9.8	7.2	5.6	8.3	5.3	6.8	7.8	6.9	5.8	550	5.9
Lithium	2.00	mg/kg	-	11	10	10	8.3	10	11	9.5	9.8	7.1	8.6	7.8	8.7	9.1	7.5	7.8	6.7
Manganese	2.00	mg/kg	-	140	110	140	110	140	140	110	110	100	110	130	130	130	140	530	130
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	3.9	3.4	3.9	3.7	5.1	6.4	3.4	3.7	3.5	3.6	3.6	4.7	5.0	8.7	290	10
Rubidium	2.0	mg/kg	-	5.3	6.3	5.3	5.6	6.0	6.8	5.5	4.4	5.3	7.0	5.1	6.6	4.8	8.9	12	11
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	4.1	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	69	nd
Strontium	5.0	mg/kg	-	5.2	nd	5.9	6.7	6.7	6.3	5.1	5.8	5.9	5.3	6.2	8.2	6.4	12	25	11
Thallium	0.1	mg/kg	1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.1	nd
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	250	nd
Uranium	0.1	mg/kg	300 [1]	0.65	0.71	0.75	0.83	0.71	0.85	0.6	0.57	0.52	0.88	0.99	0.94	0.62	0.58	0.8	0.37
Vanadium	2.0	mg/kg	130 [1]	11	6.8	12	9.6	21	19	15	11	22	7.4	9.9	13	16	34	25	30
Zinc	5.0	mg/kg	360 [1]	30	26	35	24	98	57	27	26	22	28	26	30	31	33	8,000	94

Notes:

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Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Upper Site															
				2017										2018					
				BB-SS47	BB-SS48	BB-TP39-BS1	BB-TP40-BS1	BB-TP41-BS1	BB-TP41-BS1 Lab-Dup	BB-TP41-BS1 Lab-Dup 2	BB-TP42-BS1	BB-TP43-BS1	BB-TP44-BS1	2018-SS31	2018-SS33	2018-SS42	2018-SS43	2018-SS44	2018-SS45
			Sample Depth (m):	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	-	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
Aluminum	10	mg/kg	-	7,300	6,800	8,800	8,600	12,000	13,000	-	6,400	6,300	6,500	9,000	6,400	9,100	9,400	7,200	8,100
Antimony	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	26 [1]	nd	2.1	nd	nd	7.5	9	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	2000 [1]	100	110	130	110	240	240	-	97	80	77	140	63	89	110	98	99
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	120 [3]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	22 [1]	nd	nd	nd	nd	1.1	1.4	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	2.0	mg/kg	87 [1]	22	14	27	27	3.4	5.3	-	20	18	19	32	19	26	30	22	23
Cobalt	1.0	mg/kg	300 [1]	5.3	6.5	6.2	5.2	2.3	2.9	-	4.7	3.6	3.9	6.5	3.9	4.3	5.7	3.8	4.6
Copper	2.0	mg/kg	91 [1]	36	21	21	71	*530*	*180*	470	12	15	13	18	8.7	12	19	19	25
Iron	50	mg/kg	-	17,000	29,000	20,000	19,000	46,000	47,000	-	15,000	14,000	15,000	20,000	15,000	17,000	20,000	15,000	17,000
Lead	0.5	mg/kg	600 [1]	10	9.2	16	12	75	88	-	6.0	5.6	5.2	8.8	5.9	6.7	6.7	48	84
Lithium	2.00	mg/kg	-	7.3	16	7.7	6.8	100	100	-	6.3	8.4	6.4	8.0	7.1	7.3	8.7	5.3	6.3
Manganese	2.00	mg/kg	-	160	410	180	140	620	650	-	140	110	120	190	160	120	160	120	140
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	nd	nd	nd	nd	nd	2.2	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	89 [1]	8.9	6.2	11	9.5	3.1	nd	-	7.3	8.3	7.6	13	7.3	8.3	12	7.0	8.4
Rubidium	2.0	mg/kg	-	14	24	15	14	100	110	-	12	9.8	9.9	16	13	7	14	11	12
Selenium	1.0	mg/kg	2.9 [1]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	40 [1]	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	12	8.8	18	13	9.9	9.8	-	13	12	12	13	8.6	11	14	11	12
Thallium	0.1	mg/kg	1 [1]	0.12	0.18	0.13	0.12	0.94	0.97	-	nd	nd	nd	0.14	nd	nd	0.12	0.1	0.1
Tin	2.0	mg/kg	300 [1]	nd	nd	nd	nd	5.9	7.9	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	300 [1]	0.52	1.3	0.77	0.64	4.1	4.7	-	0.65	0.64	0.64	0.63	0.41	0.41	0.71	0.42	0.46
Vanadium	2.0	mg/kg	130 [1]	32	21	38	41	2.5	2.5	-	28	25	27	36	28	34	37	32	36
Zinc	5.0	mg/kg	360 [1]	94	220	130	150	1,000	1,200	-	30	89	32	61	33	110	40	57	76

Notes:

1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).

2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)

Fld-Dup = Field duplicate sample.

Lab-Dup = Laboratory duplicate sample.

RDL = Reportable Detection Limit.

nd = Not detected above standard RDL.

"-" = Not analyzed, not applicable or no applicable guideline.

Shaded = Value exceeds applicable guideline

Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.6 Results of Laboratory Analysis of Available Metals in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Upper Site		
				2018		
				2018-SS46	2018-SS47	2018-SS48
			Sample Depth (m):	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2
Aluminum	10	mg/kg	-	100,000	7,300	8,600
Antimony	2.0	mg/kg	40 [1]	57	nd	nd
Arsenic	2.0	mg/kg	26 [1]	5.6	nd	nd
Barium	5.0	mg/kg	2000 [1]	120	140	94
Beryllium	2.0	mg/kg	8 [2]	nd	nd	nd
Bismuth	2.0	mg/kg	-	280	nd	nd
Boron	50	mg/kg	120 [3]	120	nd	nd
Cadmium	0.3	mg/kg	22 [1]	4.3	0.62	0.41
Chromium	2.0	mg/kg	87 [1]	170	30	26
Cobalt	1.0	mg/kg	300 [1]	11	6.6	5.4
Copper	2.0	mg/kg	91 [1]	48,000	180	68
Iron	50	mg/kg	-	74,000	18,000	21,000
Lead	0.5	mg/kg	600 [1]	2,100	31	15
Lithium	2.00	mg/kg	-	4.2	6.4	8.5
Manganese	2.00	mg/kg	-	1400	160	190
Mercury	0.1	mg/kg	50 [1]	nd	nd	nd
Molybdenum	2.0	mg/kg	40 [1]	2.4	nd	nd
Nickel	2.0	mg/kg	89 [1]	510	12	8.7
Rubidium	2.0	mg/kg	-	5.1	13	14
Selenium	1.0	mg/kg	2.9 [1]	240	nd	nd
Silver	0.5	mg/kg	40 [1]	150	nd	nd
Strontium	5.0	mg/kg	-	24	14	14
Thallium	0.1	mg/kg	1 [1]	0.11	nd	0.14
Tin	2.0	mg/kg	300 [1]	1,500	nd	27
Uranium	0.1	mg/kg	300 [1]	0.43	0.57	0.65
Vanadium	2.0	mg/kg	130 [1]	20	38	40
Zinc	5.0	mg/kg	360 [1]	4,600	380	140

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999 and updates).
2 = Canadian Council of Ministers of the Environment (CCME) Interim remediation criteria that have not yet been replaced by SQGs (1991). Commercial land use.
3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011)
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.
Shaded = Value exceeds applicable guideline
Italicized/Underlined = Poor relative percent difference in laboratory initiated duplicate samples due to sample inhomogeneity

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area							Camp / Antenna Areas and AES Compound									
				2017						2018	2017									
				BB-SS1	BB-SS2	BB-SS3	BB-SS3 Lab-Dup	BB-SS7	BB-SS10	2018-MW48-GP01	BB-SS30	BB-SS301 (Fld Dup of BB-SS30)	BB-TP17-BS1	BB-TP18-BS1	BB-TP18-BS2	BB-TP19-BS1	BB-TP20-BS1	BB-TP20-BS2	BB-TP201-BS2 (Fld Dup of BB-TP20-BS2)	BB-TP21-BS1
Sample Depth (m):				0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	-	0.0 - 0.1	0.0 - 0.1	0.0 - 0.9	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.063	0.10	0.074	0.12	0.14	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.059	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	0.063	0.16	0.074	0.12	0.14	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Camp / Antenna Areas and AES Compound															
				2017															
				BB-TP22-BS1	BB-TP22-BS2	BB-TP221-BS2 (Fld Dup of BB-TP22-BS2)	BB-TP23-BS1	BB-TP24-BS1	BB-TP25-BS1	BB-TP25-BS2	BB-TP26-BS1	BB-TP27-BS1	BB-TP27-BS2	BB-TP28-BS1	BB-TP28-BS1 Lab-Dup	BB-TP30-BS1	BB-TP31-BS1	BB-TP32-BS1	BB-TP32-BS2	BB-TP33-BS1
Sample Depth (m):				0.0 - 0.25	0.25 - 0.50	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.25	-	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.25 - 0.50	0.0 - 0.25
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	0.092	0.23	0.23	nd	nd	0.097	0.17	0.46	nd	nd	nd	nd	nd	0.18	nd	nd	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	0.092	0.23	0.23	nd	nd	0.097	0.17	0.46	nd	nd	nd	-	nd	0.18	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Camp / Antenna Areas and AES Compound										Unknown Foundation / Building					Waste Disposal Sites	
				2017	2018									2017					2017	
				BB-TP34-BS1	2018-SS03	2018-SS07	2018-SS14	2018-SS62 (Fld Dup of 2018-SS14)	2018-MW09-GP01	2018-MW66-GP01 (Fld Dup of 2018-MW09-GP01)	2018-MW14-GP01	2018-MW17-GP01	2018-MW32-GP01	BB-TP35-BS1	BB-SS41	BB-SS42	BB-TP36-BS1	BB-TP36-BS1 Lab-Dup	BB-SS13	BB-SS14
Sample Depth (m):				0.0 - 0.25	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.9	0.0 - 0.9	0.0 - 0.9	0.0 - 0.9	0.0 - 0.9	0.0 - 0.25	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	-	0.0 - 0.1	0.0 - 0.1
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	nd	nd	nd	0.36	0.38	0.14	0.10	nd	nd	0.098	nd	nd	nd	nd	nd	nd	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	nd	nd	nd	0.36	0.38	0.14	0.10	nd	nd	0.098	nd	nd	nd	nd	-	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Waste Disposal Sites																
				2017																
				BB-SS15	BB-SS16	BB-SS18	BB-SS19	BB-SS20	BB-SS23	BB-TP5-BS1	BB-TP7-BS1	BB-TP71-BS1 (Fld Dup of BB-TP7-BS1)	BB-TP8-BS1	BB-TP9-BS1	BB-TP9-BS1 Lab-Dup	BB-TP12-BS1	BB-TP121-BS1 (Fld Dup of BB-TP12-BS1)	BB-TP13-BS2	BB-TP15-BS1	BB-TP16-BS2
Sample Depth (m):				0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	0.0 - 0.1	0.0 - 0.25	0.0 - 0.25	-	0.0 - 0.25	0.0 - 0.1	0.25 - 0.50	0.0 - 0.25	0.25 - 0.50
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	0.21	nd	nd	nd	nd	nd	nd	nd	nd	0.68	nd	nd	nd	nd	nd	nd	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	0.21	nd	nd	nd	nd	nd	nd	nd	nd	0.68	nd	-	nd	nd	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Waste Disposal Sites						Former Innu Camp		General Dump Site		Upper Site						
				2017	2018					2018		2018		2017						
				BB-TP161-BS2 (Fld Dup of BB-TP16-BS2)	2018-MW33-GP01	2018-MW37-GP02	2018-MW38-GP01	2018-MW39-GP02	2018-MW40-GP01	2018-SS27	2018-SS29	2018-SS23	2018-SS25	BB-SS43	BB-SS44	BB-SS46	BB-SS47	BB-SS48	BB-SS49	BB-SS50
Sample Depth (m):				0.0 - 0.1	0.0 - 0.9	0.9 - 1.8	0.0 - 0.9	0.9 - 1.8	0.0 - 0.9	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.2	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1	0.0 - 0.1
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.066	nd	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.066	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.7 Results of Laboratory Analysis of PCBs in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Upper Site						
				2017						2018
				BB-TP39-BS1	BB-TP40-BS1	BB-TP41-BS1	BB-TP42-BS1	BB-TP43-BS1	BB-TP44-BS1	2018-SS39
Sample Depth (m):				0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.25	0.0 - 0.2
Aroclor 1016	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Aroclor 1260	0.050	µg/g	-	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	µg/g	33	nd	nd	nd	nd	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for Commercial land use (1999
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit
nd = Not detected above standard RDL.
"-" = Not applicable or no applicable guideline.

Table F.8 Results of Laboratory Analysis of Organochlorinated Pesticides in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Organochlorinated Pesticides	RDL	Units	Guideline	Waste Disposal Sites		Upper Site
				2017		2017
				BB-SS15	BB-TP7-BS1	BB-SS46
Sample depth (m)				0.0 - 0.1	0.0 - 0.25	0.0 - 0.1
Pesticides and Herbicides						
Aldrin	0.0020	ug/g	5.1[2]	nd (0.0030)	nd	nd (0.020)
a-Chlordane	0.0020	ug/g	0.05[3]	nd (0.0030)	nd	nd (0.020)
g-Chlordane	0.0020	ug/g		nd (0.0030)	nd	nd (0.020)
o,p-DDD	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
p,p-DDD	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
o,p-DDE	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
p,p-DDE	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
o,p-DDT	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
p,p-DDT	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Dieldrin	0.0020	ug/g	5.1[2]	nd (0.0030)	nd	nd (0.020)
Lindane	0.0020	ug/g	10[2]	nd (0.0030)	nd	nd (0.020)
Endosulfan I (alpha)	0.0020	ug/g	0.0015[2]	*nd (0.0030)*	*nd*	*nd (0.020)*
Endosulfan II (beta)	0.0020	ug/g		*nd (0.0030)*	*nd*	*nd (0.020)*
Endrin	0.0020	ug/g	15[2]	nd (0.0030)	nd	nd (0.020)
Heptachlor	0.0020	ug/g	0.19[3]	nd (0.0030)	nd	nd (0.020)
Heptachlor epoxide	0.0020	ug/g	0.69[2]	nd (0.0030)	nd	nd (0.020)
Hexachlorobenzene	0.0020	ug/g	0.66[3]	nd (0.0030)	nd	nd (0.020)
Methoxychlor	0.0050	ug/g	0.056[2]	nd (0.0075)	nd	nd (0.050)
alpha-BHC	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
beta-BHC	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
delta-BHC	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Endosulfan sulfate	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Endrin aldehyde	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Endrin ketone	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Mirex	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Octachlorostyrene	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Toxaphene	0.08	ug/g	7.3[2]	nd (0.12)	nd	nd (0.80)
Calculated Parameters						
Aldrin + Dieldrin	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
Chlordane (Total)	0.0020	ug/g	0.05[3]	nd (0.0030)	nd	nd (0.020)
DDT+ Metabolites	0.0020	ug/g	12[1]	nd (0.0030)	nd	nd (0.020)
Heptachlor + Heptachlor epoxide	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)
o,p-DDD + p,p-DDD	0.0020	ug/g	4.6[3]	nd (0.0030)	nd	nd (0.020)
o,p-DDE + p,p-DDE	0.0020	ug/g	0.52[3]	nd (0.0030)	nd	nd (0.020)
o,p-DDT + p,p-DDT	0.0020	ug/g	0.14[3]	nd (0.0030)	nd	nd (0.020)
Total Endosulfan	0.0020	ug/g	-	nd (0.0030)	nd	nd (0.020)

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health for commercial land use (1999 and Updates).
2 = Alberta Tier I Soil and Groundwater Remediation Guidelines: Table A-4 Surface Soil Remediation Guidelines for Commercial Land Use - All Exposure Pathways, coarse-grained soil (2016) (assuming non-potable groundwater).

3 = Soil and Groundwater Standards for Use at Contaminated Sites in Ontario: Table 3 - Full Depth, Non-Potable Water Scenario, Commercial/Industrial Land Use (2011).
RDL = Reportable Detection Limit.
nd (#) = Not detected above elevated RDL shown.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.
Underlined/Italicized = RDL exceeds the applicable guideline.

Table F.9 Results of Laboratory Analysis of Total Organic Carbon in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth	TOC
		RDL	500
		Units	mg/kg
2017	**Lower Site - General Area**		
	BB-SS3	0.0 - 0.1	24,000
	Camp / Antenna Areas and AES Compound		
	BB-TP35-BS1	0.0 - 0.25	20,000
	Waste Disposal Sites		
	BB-TP4-BS1	0.0 - 0.25	14,000
	Upper Site		
	BB-TP41-BS1	0.0 - 0.25	13,000

Notes:
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.10 Results of Laboratory Analysis of Asbestos in Soil
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

	Sample ID	Sample Depth	Asbestos
		RDL	-
		Units	mg/kg
2017	**Camp / Antenna Areas and AES Compound**		
	BB-SS25	0.0 - 0.1	nd
	BB-SS34	0.0 - 0.1	nd
	BB-TP25-BS1	0.0 - 0.25	nd
	Waste Disposal Sites		
	BB-SS14	0.0 - 0.1	nd
	BB-SS18	0.0 - 0.1	nd
	BB-SS21	0.0 - 0.1	nd
	Upper Site		
	BB-SS45	0.0 - 0.1	nd
	BB-TP42-BS1	0.0 - 0.25	nd

Notes:
RDL = Reportable Detection Limit. No detection limit given.
nd = None Detected.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.11 Results of Laboratory Analysis of Petroleum Hydrocarbons in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Sample ID	Depth to Groundwater (m)	BTEX Parameters (mg/L)				Total Petroleum Hydrocarbons (mg/L)					Resemblance
		Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	F3 (C_{16}-C_{32})	Returned to baseline?[4]	Modified TPH[5]	
RDL		0.0010	0.0010	0.0010	0.0020	0.010	0.050	0.10	-	0.10	-
Tier I ESLs - Plants and Invertebrates [1]		350	200	110	120	11	3.1	-	-	-	-
Tier I ESLs - Aquatic Life [2]		4.6	4.2	3.2	2.8	-	-	-	-	13 / 0.84 / 0.48	-
Tier I RBSLs [3]		20	20	20	20	-	-	-	-	20 / 20 / 20	-
Lower Site - General Area (2018)											
2018-MW47	4.70	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018-MW68 (Fld-Dup of 2018-MW47)	4.70	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Camp / Antenna Areas and AES Compound (2018)											
2018-MW01	5.73	nd	nd	nd	nd	nd	nd	0.014	Yes	0.14	UC-FOR
2018-MW01 Lab-Dup	-	nd	nd	nd	nd	nd	-	-	-	-	-
2018-MW09	7.74	nd	nd	nd	nd	nd	nd	0.092	-	nd	-
2018-MW11	6.93	nd	nd	nd	nd	nd	0.065	0.34	Yes	0.41	UC-FOR
2018-MW14	6.83	nd (0.010)	nd (0.010)	nd (0.010)	0.086	0.94	8.5	0.72	Yes	**10**	FOF
2018-MW17	2.97	nd	nd	nd	nd	0.14	59	6.3	Yes	**65**	WFOF
2018-MW18	3.53	nd	nd	nd	0.029	0.66	20	3.4	Yes	**24**	FOF
2018-MW20	6.49	nd (0.010)	0.060	0.040	1.4	2.4	38	3.8	Yes	**44**	FOF
2018-MW26	2.29	nd	nd	0.0015	0.025	0.84	88	16	Yes	**100**	FOF
2018-MW27	7.93	nd (0.010)	nd (0.010)	nd (0.010)	0.13	1.6	170	17	Yes	**180**	FOF
2018-MW31	6.61	nd	nd	0.011	0.19	1.3	58	8.9	Yes	**68**	FOF/PLOF
2018-MW32	7.46	nd (0.010)	nd (0.010)	nd (0.010)	0.23	1.7	64	5.2	Yes	**71**	FOF
2018-MW50	4.35	nd	nd	nd	0.022	0.67	50	8.8	Yes	**59**	FOF
Waste Disposal Sites (2018)											
2018-MW33	1.96	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018-MW34	1.37	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018-MW37	1.54	nd	0.012	nd	nd	0.010	nd	nd	-	nd	-
2018-MW39	2.15	nd	0.0072	0.0080	0.044	0.58	0.90	nd	Yes	1.5	GR/FOR
2018-MW41	5.23	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Former Innu Camp (2018)											
2018-MW46	3.80	nd	nd	nd	nd	nd	nd	nd	-	nd	-
General Dump Site (2018)											
2018-MW43	6.44	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:

1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Ecological Screening Levels (ESLs) for Plant and Soil invertebrate Direct Contact with Shallow Groundwater (Table 2), for an industrial site with coarse grained soil (July 2012. revised January 2015). ESLs are applicable only if groundwater is present within 3 m of ground surface.

2 = Atlantic Partnership in RBCA Implementation Tier I ESLs for the Protection of Freshwater and Marine Aquatic Life (Table 3a), for groundwater with gasoline/fuel oil/lube oil impacts (July 2012, revised January 2015).

3 = Atlantic Partnership in RBCA Implementation Tier I Risk-Based Screening Levels (RBSLs) for Groundwater (Table 4b), for a commercial site with non-potable groundwater, coarse grained soil and gasoline/fuel oil/lube oil impacts (July 2012, revised January 2015).

4 =Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.

5 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).

RDL = Reportable Detection Limit
nd = Not detected above standard RDL
nd (#) = Not detected above elevated RDL shown

Underlined = Value exceeds Tier I ESL - Plants and Invertebrates
Bold = Value exceeds Tier I ESL - Freshwater and Marine Aquatic Life
Shaded = Value exceeds Tier I RBSL

Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
"-" = Not analyzed, not applicable or no applicable guideline

Resemblance:
FOF = fuel oil fraction
FOR = fuel oil range
GR = gasoline range
WFO = weathered fuel oil fraction
PLOF = possible lube oil fraction
UC = unidentified compounds

Table F.12 Results of Laboratory Analysis of General Chemistry in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area (2018)		Camp / Antenna Areas and AES Compound (2018)								
				2018-MW47	2018-MW68 (Fld-Dup of 2018-MW47)	2018-MW01	2018-MW01 Lab-Dup	2018-MW09	2018-MW11	2018-MW14	2018-MW17	2018-MW18	2018-MW20	2018-MW26
Depth to Groundwater (m):				**4.70**	**4.70**	**5.73**	**-**	**7.74**	**6.93**	**6.83**	**2.97**	**3.53**	**6.49**	**2.29**
Calculated Parameters														
Anion Sum	N/A	me/L	-	0.15	0.13	0.29	-	0.29	2.65	0.66	0.41	0.26	0.40	0.35
Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	-	7.2	6.1	11	-	8.3	nd	23	20	10	17	17
Calculated TDS	1	mg/L	-	13	12	22	-	25	150	50	29	23	31	25
Carb. Alkalinity (calc. as CaCO3)	1	mg/L	-	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd
Cation Sum	N/A	me/L	-	0.13	0.13	0.32	-	0.29	2.15	0.50	0.19	0.26	0.36	0.22
Hardness (CaCO3)	1	mg/L	-	4.1	4.3	11	-	9.1	13	19	7.2	11	14	7.9
Ion Balance (% Difference)	N/A	%	-	7.14	0.00	4.92	-	0.00	10.4	13.8	36.7	0.00	5.26	22.8
Langelier Index (@ 20C)				-3.36	-3.45	-2.72	-	-2.94	NC	-2.49	-2.93	-3.28	-2.48	-2.99
Langelier Index (@ 4C)		N/A	-	-3.61	-3.71	-2.97	-	-3.19	NC	-2.74	-3.18	-3.54	-2.73	-3.25
Nitrate (N)	0.050	N/A	-	0.085	0.094	0.074	-	0.64	0.17	nd	nd	nd	nd	nd
Saturation pH (@ 20C)		N/A	-	10.3	10.3	9.74	-	9.89	NC	9.24	9.68	9.79	9.42	9.72
Saturation pH (@ 4C)		N/A	-	10.5	10.6	9.99	-	10.1	NC	9.49	9.93	10	9.67	9.97
Inorganics														
Total Alkalinity (Total as CaCO3)	5	mg/L	-	7.3	6.1	11	-	8.3	nd	23	20	10	17	17
Dissolved Chloride (Cl)	1	mg/L	230	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd
Colour	5	TCU	-	nd	nd	nd	-	nd	nd	7.9	11	nd	7.1	6.7
Nitrate + Nitrite	0.050	mg/L	-	0.085	0.094	0.074	-	0.64	0.17	nd	nd	nd	nd	nd
Nitrite (N)	0.010			nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd
Nitrogen (Ammonia Nitrogen)	0.050	mg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Total Organic Carbon (C)	0.5	mg/L	-	nd (5.0)	<5.0	nd (5.0)	-	nd (5.0)	nd (5.0)	4.4	16	4.6	14	6.1
Orthophosphate (P)	0.010	mg/L	-	nd	nd	nd	-	nd	0.088	nd	nd	nd	nd	nd
pH	N/A	pH	6.5 - 9.0	6.92	6.87	7.02	-	6.95	2.75	6.75	6.75	6.50	6.94	6.73
Reactive Silica (SiO2)	0.5	mg/L	-	5.8	4.9	6.1	-	7.3	11	16	13	8.6	10	9.8
Dissolved Sulphate (SO4)	2.0	mg/L	-	nd	nd	2.6	-	3.7	130	8.9	nd	2.6	2.5	nd
Turbidity	0.1	NTU	narrative	>1,000	400	100	-	210	160	56	230	69	>1,000	330
Conductivity	1	uS/cm	-	17	13	31	-	32	840	68	47	25	40	29

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial / Industrial Land Use (assuming non-potable groundwater) (Table B-4)

RDL = Reportable Detection Limit
nd = Not detected above standard RDL
nd (#) = Not detected above elevated RDL shown
"-" = Not analyzed, not applicable or no applicable guideline
Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
Shaded = Value exceeds applicable guideline

Table F.12 Results of Laboratory Analysis of General Chemistry in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Camp / Antenna Areas and AES Compound (2018)					Waste Disposal Sites (2018)						Former Innu Camp (2018)	General Dump Site (2018)
				2018-MW27	2018-MW31	2018-MW32	2018-MW50	2018-MW50 Lab Dup	2018-MW33	2018-MW34	2018-MW37	2018-MW39	2018-MW41	2018-MW41 Lab Dup	2018-MW46	2018-MW43
Depth to Groundwater (m):				**7.93**	**6.61**	**7.46**	**4.35**	**-**	**1.96**	**1.37**	**1.54**	**2.15**	**5.23**	**-**	**3.80**	**6.44**
Calculated Parameters																
Anion Sum	N/A	me/L	-	0.34	0.81	0.39	0.17	-	0.0	0.13	0.0	0.0	0.18	-	0.24	0.20
Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	-	17	40	19	5.2	-	nd	6.4	nd	nd	5.5	-	8.7	9.6
Calculated TDS	1	mg/L	-	29	60	30	14	-	4.0	8.0	3.0	3.0	15	-	20	14
Carb. Alkalinity (calc. as CaCO3)	1	mg/L	-	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	-	nd	nd
Cation Sum	N/A	me/L	-	0.37	0.87	0.38	0.11	-	0.1	0.1	0.04	0.03	0.15	-	0.22	0.19
Hardness (CaCO3)	1	mg/L	-	15	36	16	3.9	-	3.3	2.6	1.1	nd	5.4	-	7.0	6.4
Ion Balance (% Difference)	N/A	%	-	4.23	3.57	1.3	21.4	-	100	13	100	100	9.09	-	4.35	2.56
Langelier Index (@ 20C)				-2.81	-2.09	-2.71	-4.41	-	NC	-4.34	NC	NC	-3.73	-	-3.16	-3.22
Langelier Index (@ 4C)		N/A	-	-3.07	-2.34	-2.96	-4.67	-	NC	-4.6	NC	NC	-3.98	-	-3.41	-3.48
Nitrate (N)	0.050	N/A	-	nd	nd	nd	nd	-	0.055	nd	nd	nd	0.25	-	0.28	0.084
Saturation pH (@ 20C)		N/A	-	9.46	8.75	9.36	10.4	-	NC	10.6	NC	NC	10.3	-	9.98	9.99
Saturation pH (@ 4C)		N/A	-	9.71	9	9.62	10.7	-	NC	10.8	NC	NC	10.6	-	10.2	10.2
Inorganics																
Total Alkalinity (Total as CaCO3)	5	mg/L	-	17	40	19	5.2	5.0	nd	6.4	nd	<5.0	5.5	-	8.7	9.6
Dissolved Chloride (Cl)	1	mg/L	230	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
Colour	5	TCU	-	5.3	36	7.8	6.6	7.5	nd	8.0	nd	5.6	nd	-	nd	nd
Nitrate + Nitrite	0.050	mg/L	-	nd	nd	nd	nd	nd	0.055	nd	nd	nd	0.25	-	0.28	0.084
Nitrite (N)	0.010			nd	nd	nd	nd	nd	nd	nd	0.012	nd	nd	-	nd	nd
Nitrogen (Ammonia Nitrogen)	0.050	mg/L	-	nd	nd	nd	nd	-	n	0.06	nd	nd	nd		nd	nd
Total Organic Carbon (C)	0.5	mg/L	-	8.8	23	8.0	9.5	-	5.3	81	nd (50)	nd (50)	0.84	0.83	nd (5.0)	7.3
Orthophosphate (P)	0.010	mg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd
pH	N/A	pH	6.5 - 9.0	6.65	6.66	6.65	6.03	-	6.55	6.24	6.03	5.84	6.59	-	6.82	6.77
Reactive Silica (SiO2)	0.5	mg/L	-	11	18	11	5.3	5.4	1.7	2.3	2.1	2.3	4.8	-	6.1	4.1
Dissolved Sulphate (SO4)	2.0	mg/L	-	nd	nd	nd	3.1	3.1	nd	nd	nd	nd	2.4	-	2.5	nd
Turbidity	0.1	NTU	narrative	270	110	150	200	-	480	>1,000	>1,000	>1,000	58	-	>1,000	600
Conductivity	1	uS/cm	-	33	82	40	19	-	11	11	9.3	6.3	19	-	24	19

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial / Industrial Land Use (assuming non-potable groundwater) (Table B-4)

RDL = Reportable Detection Limit
nd = Not detected above standard RDL
nd (#) = Not detected above elevated RDL shown
"-" = Not analyzed, not applicable or no applicable guideline
Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
Shaded = Value exceeds applicable guideline

Table F.13 Results of Laboratory Analysis of PAHs in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area (2018)		Camp / Antenna Areas and AES Compound (2018)									
				2018-MW47	2018-MW68 (Fld-Dup of 2018-MW47)	2018-MW01	2018-MW09	2018-MW11	2018-MW14	2018-MW17	2018-MW18	2018-MW20	2018-MW26	2018-MW27	2018-MW31
Depth to Groundwater (m):				**4.70**	**4.70**	**5.73**	**7.74**	**6.93**	**6.83**	**2.97**	**3.53**	**6.49**	**2.29**	**7.93**	**6.61**
1-Methylnaphthalene	0.050	µg/L	1,500 [2]	nd	nd	nd	0.090	nd	150	13	80	150	1,600	960	220
2-Methylnaphthalene	0.050	µg/L	1,500 [2]	nd	nd	nd	0.12	nd	190	9.2	95	210	1,800	1,700	360
Acenaphthene	0.010	µg/L	5.8 [1]	nd	nd	nd	nd	nd	nd (3.0)	nd (2.5)	nd (2.5)	nd (3.0)	270	*nd (16)*	*nd (8.0)*
Acenaphthylene	0.010	µg/L	46 [1]	nd	nd	nd	nd	nd	nd (2.0)	nd (1.4)	nd (2.0)	nd (2.0)	*nd (71)*	nd (15)	nd (4.0)
Anthracene	0.010	µg/L	0.012 [1]	nd	nd	nd	nd	nd	*nd (0.040)*	*nd (0.060)*	*nd (0.050)*	*nd (0.080)*	2.2	*nd (0.80)*	*nd (0.40)*
Benzo(a)anthracene	0.010	µg/L	0.018 [1]	nd	nd	nd	nd	nd	nd	*nd (0.020)*	nd	nd	*nd (0.40)*	*nd (0.030)*	*nd (0.050)*
Benzo(a)pyrene	0.010	µg/L	0.015 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.30)*	*nd (0.020)*	*nd (0.030)*
Benzo(b)fluoranthene	0.010	µg/L	0.48 [1,3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.30)	nd (0.020)	nd (0.030)
Benzo(b/j)fluoranthene	0.020	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.60)	nd (0.030)	nd (0.050)
Benzo(g,h,i)perylene	0.010	µg/L	0.17 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.30)*	nd	nd (0.040)
Benzo(j)fluoranthene	0.010	µg/L	0.48 [1,3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.30)	nd	nd (0.020)
Benzo(k)fluoranthene	0.010	µg/L	0.48 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.30)	nd	nd
Chrysene	0.010	µg/L	1.4 [1]	nd	nd	nd	nd	nd	nd	0.036	0.017	nd (0.030)	1.6	0.11	nd (0.090)
Dibenzo(a,h,)anthracene	0.010	µg/L	0.26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.30)*	nd	nd
Fluoranthene	0.010	µg/L	0.04 [1]	nd	nd	nd	nd	nd	nd	nd (0.040)	nd (0.030)	nd (0.040)	2.8	0.19	0.12
Fluorene	0.010	µg/L	3 [1]	nd	nd	nd	nd	nd	2.9	1.4	2.7	3.7	190	57	3.5
Indeno(1,2,3-c,d) pyrene	0.010	µg/L	0.21 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.30)*	nd	nd (0.020)
Naphthalene	0.20	µg/L	1.1 [1]	nd	nd	nd	nd	nd	110	*nd (3.0)*	56	130	150	460	110
Perylene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.30)	nd (0.020)	nd (0.020)
Phenanthrene	0.010	µg/L	0.4 [1]	nd	nd	nd	nd	nd	*nd (2.0)*	*nd (1.0)*	*nd (2.5)*	*nd (3.0)*	170	25	*nd (10)*
Pyrene	0.010	µg/L	0.025 [1]	nd	nd	nd	nd	nd	nd (0.020)	0.059	*nd (0.030)*	*nd (0.040)*	3.6	0.26	0.26

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial/Industrial Land Use (assuming non-potable groundwater) (Table B-1)

2 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

3 = Guideline represents benzo(b+j)fluoranthene

RDL = Reportable Detection Limit

nd = Not detected above standard RDL

nd (#) = Not detected above elevated RDL shown

"-" = Not analyzed, not applicable or no applicable guideline

Fld-Dup = Field duplicate sample

Shaded = Value exceeds applicable guideline

Underlined/Italicized = RDL exceeds applicable guideline

Table F.13 Results of Laboratory Analysis of PAHs in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Camp / Antenna Areas and AES Compound (2018)		Waste Disposal Sites (2018)					Former Innu Camp (2018)	General Dump Site (2018)
				2018-MW32	2018-MW50	2018-MW33	2018-MW34	2018-MW37	2018-MW39	2018-MW41	2018-MW46	2018-MW43
Depth to Groundwater (m):				**7.46**	**4.35**	**1.96**	**1.37**	**1.54**	**2.15**	**5.23**	**3.80**	**6.44**
1-Methylnaphthalene	0.050	µg/L	1,500 [2]	180	170	nd	nd	nd	20	nd	nd	0.14
2-Methylnaphthalene	0.050	µg/L	1,500 [2]	300	160	nd	nd	nd	29	nd	nd	0.18
Acenaphthene	0.010	µg/L	5.8 [1]	1.6	nd (7.0)	nd	nd (0.020)	nd (0.020)	nd (0.90)	nd	nd	nd (0.040)
Acenaphthylene	0.010	µg/L	46 [1]	nd (2.0)	nd (3.0)	nd	nd	nd	nd (0.30)	nd	nd	nd (0.020)
Anthracene	0.010	µg/L	0.012 [1]	2.6	*nd (0.30)*	nd	nd	nd	*nd (0.030)*	nd	nd	nd
Benzo(a)anthracene	0.010	µg/L	0.018 [1]	nd	*nd (0.030)*	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	µg/L	0.015 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	µg/L	0.48 [1,3]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b/j)fluoranthene	0.020	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	µg/L	0.17 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	µg/L	0.48 [1,3]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	µg/L	0.48 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	µg/L	1.4 [1]	nd	nd (0.20)	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	µg/L	0.26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	µg/L	0.04 [1]	nd	*nd (0.060)*	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	µg/L	3 [1]	5.0	3.8	nd	0.016	nd	1.6	nd	nd	0.054
Indeno(1,2,3-c,d) pyrene	0.010	µg/L	0.21 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.20	µg/L	1.1 [1]	210	*nd (9.0)*	nd	nd	nd	15	nd	nd	nd
Perylene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	µg/L	0.4 [1]	2.3	*nd (9.0)*	nd	nd (0.020)	nd	*nd (0.50)*	nd	nd	nd (0.050)
Pyrene	0.010	µg/L	0.025 [1]	nd	0.17	nd	nd	nd	nd	nd	nd	nd

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial/Industrial Land Use (assuming non-potable groundwater) (Table B-1)

2 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

3 = Guideline represents benzo(b+j)fluoranthene

RDL = Reportable Detection Limit

nd = Not detected above standard RDL

nd (#) = Not detected above elevated RDL shown

"-" = Not analyzed, not applicable or no applicable guideline

Fld-Dup = Field duplicate sample

Shaded = Value exceeds applicable guideline

Underlined/Italicized = RDL exceeds applicable guideline

Table F.14 Results of Laboratory Analysis of Dissolved Metals in Groundwater

Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment

Site 212, Border Beacon, NL

Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area (2018)		Camp / Antenna Areas and AES Compound (2018)				
				2018-MW47	2018-MW68 (Fld-Dup of 2018-MW47)	2018-MW01	2018-MW09	2018-MW11	2018-MW14	2018-MW17
Depth to Groundwater (m):				4.70	4.70	5.73	7.74	6.93	6.83	2.97
pH:				6.92	6.87	7.02	6.95	2.75	6.75	6.75
Hardness (mg/L as $CaCO_3$):				4.1	4.3	11	9.1	13	19	7.2
Aluminium guideline				100	100	100	100	100 [8]	100	100
Cadmium guideline				0.040	0.040	0.040	0.040	0.040	0.040	0.040
Lead guideline				1.0	1.0	1.0	1.0	2.0	1.0	1.0
Nickel guideline				3.5	3.6	8.1	6.9	25	13	5.6
Aluminum	5.0	µg/L	5 - 100 [1,3]	32	9.5	330	14	61	15	130
Antimony	1.0	µg/L	16,000 [2]	nd	nd	nd	nd	nd	nd	nd
Arsenic	1.0	µg/L	5 [1]	nd	nd	nd	nd	nd	nd	nd
Barium	1.0	µg/L	23,000 [2]	17	31	34	32	20	61	73
Beryllium	1.0	µg/L	53 [2]	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Boron	50	µg/L	1,500 [1]	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.010	µg/L	0.04 - 0.37 [1,4]	nd	nd	nd	nd	nd	0.016	0.050
Calcium	100	µg/L	-	1,300	1,400	3,100	3,000	4,100	5,200	2,000
Chromium	1.0	µg/L	640 [2]	nd	nd	2.5	nd	nd	nd	nd
Cobalt	0.40	µg/L	52 [2]	nd	nd	0.73	nd	nd	1.9	1.4
Copper	2.0	µg/L	7 [1]	nd	nd	nd	nd	nd	nd	2.1
Iron	50	µg/L	300 [1]	nd	nd	880	nd	59	1,700	140
Lead	0.50	µg/L	1 - 7 [1,6]	nd	nd	1.4	nd	nd	36	2.9
Magnesium	100	µg/L	-	190	180	890	380	620	1400	530
Manganese	2.0	µg/L	-	30	30	39	16	43	370	480
Molybdenum	2.0	µg/L	7,300 [2]	nd	nd	nd	2.2	nd	nd	5.8
Nickel	2.0	µg/L	25 - 150 [1,7]	nd	nd	nd	nd	nd	nd	nd
Phosphorous	100	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Potassium	100	µg/L	-	610	530	890	800	1,100	990	450
Selenium	1.0	µg/L	1 [1]	nd	nd	nd	nd	nd	nd	nd
Silver	0.10	µg/L	0.1 [1]	nd	nd	nd	nd	nd	nd	nd
Sodium	100	µg/L	1,800,000 [2]	700	680	800	1,900	1,500	760	660
Strontium	2.0	µg/L	-	8.6	9.1	11	15	18	40	14
Thallium	0.10	µg/L	400 [2]	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Titanium	2.0	µg/L	-	2.0	nd	22	nd	2.7	nd	nd
Uranium	0.10	µg/L	15 [1]	nd	nd	0.26	nd	nd	0.3	0.39
Vanadium	2.0	µg/L	200 [2]	nd	nd	nd	nd	nd	nd	nd
Zinc	5.0	ug/L	30 [1]	nd	nd	11	nd	nd	nd	nd

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial/Industrial Land Use (assuming non-potable groundwater) (Table B-4)

2 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

3 = Aluminum guideline = 5 µg/L at pH<6.5, or 100 µg/L at pH>=6.5

4 = Cadmium guideline [µg/L] = $10^{0.83[\log(\text{hardness})]-2.46}$, for water hardness between 17 and 280 mg/L as CaCO3; For water hardness<17, guideline =0.04; For water hardness>280, guideline =0.37; For unknown water hardness, guideline = 0.04

5 = Copper guideline [µg/L] = $0.2 * e^{0.8545[\ln(\text{hardness})]-1.465}$, for water hardness between 82 and 180 mg/L as $CaCO_3$; If water hardness is <82, guideline = 2; If water hardness is >180, guideline = 4; If water hardness is unknown, guideline = 2

6 = Lead guideline [µg/L] = $e^{1.273[\ln(\text{hardness})]-4.705}$, for water hardness between 60 and 180 mg/L as $CaCO_3$; If water hardness is less than 60, guideline = 1; If water hardness is greater than 180, guideline = 7; If water hardness is unknown, guideline = 1

7 = Nickel guideline [µg/L] = $e^{0.846[\ln(\text{hardness})]+0.0584}$

8 = Based on pH measured at the closest monitor well

RDL = Reportable Detection Limit

nd = Not detected above standard RDL

nd (#) = Not detected above elevated RDL shown

Fld-Dup = Field duplicate sample

"-" = Not analyzed, not applicable or no applicable guideline

Shaded = Value exceeds applicable guideline

Table F.14 Results of Laboratory Analysis of Dissolved Metals in Groundwater

Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment

Site 212, Border Beacon, NL

Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Camp / Antenna Areas and AES Compound (2018)						
				2018-MW18	2018-MW20	2018-MW26	2018-MW27	2018-MW31	2018-MW32	2018-MW50
Depth to Groundwater (m):				3.53	6.49	2.29	7.93	6.61	7.46	4.35
pH:				6.50	6.94	6.73	6.65	6.66	6.65	6.03
Hardness (mg/L as $CaCO_3$):				11	14	7.9	15	36	16	3.9
Aluminium guideline				100	100	100	100	100	100	5
Cadmium guideline				0.040	0.040	0.040	0.040	0.068	0.040	0.040
Lead guideline				1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nickel guideline				8.1	10	6	10	22	11	3.4
Aluminum	5.0	µg/L	5 - 100 [1,3]	18	33	35	24	27	6.4	67
Antimony	1.0	µg/L	16,000 [2]	nd	nd	nd	nd	nd	nd	nd
Arsenic	1.0	µg/L	5 [1]	nd	nd	nd	nd	nd	nd	nd
Barium	1.0	µg/L	23,000 [2]	39	130	38	43	160	70	49
Beryllium	1.0	µg/L	53 [2]	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Boron	50	µg/L	1,500 [1]	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.010	µg/L	0.04 - 0.37 [1,4]	0.017	0.030	0.020	0.024	0.052	0.021	0.028
Calcium	100	µg/L	-	3,000	4,300	2,100	4,000	9,300	4,400	1,300
Chromium	1.0	µg/L	640 [2]	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.40	µg/L	52 [2]	1.4	2.5	1.5	1.8	4.8	2.2	2.3
Copper	2.0	µg/L	7 [1]	nd	nd	nd	nd	nd	nd	nd
Iron	50	µg/L	300 [1]	210	360	180	nd	170	160	110
Lead	0.50	µg/L	1 - 7 [1,6]	1.0	74	nd	nd	nd	0.77	nd
Magnesium	100	µg/L	-	740	810	660	1,100	3,100	1,100	190
Manganese	2.0	µg/L	-	160	250	190	280	1,000	180	150
Molybdenum	2.0	µg/L	7,300 [2]	nd	nd	nd	3.8	nd	nd	nd
Nickel	2.0	µg/L	25 - 150 [1,7]	nd	2.9	nd	nd	2.2	nd	nd
Phosphorous	100	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Potassium	100	µg/L	-	670	1,100	1,000	1,500	1,900	810	310
Selenium	1.0	µg/L	1 [1]	nd	nd	nd	nd	nd	nd	nd
Silver	0.10	µg/L	0.1 [1]	nd	nd	nd	nd	nd	nd	nd
Sodium	100	µg/L	1,800,000 [2]	570	880	550	890	2,200	920	460
Strontium	2.0	µg/L	-	22	28	12	19	55	22	10
Thallium	0.10	µg/L	400 [2]	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Titanium	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Uranium	0.10	µg/L	15 [1]	nd	0.12	0.12	0.11	0.26	nd	nd
Vanadium	2.0	µg/L	200 [2]	nd	nd	nd	nd	nd	nd	nd
Zinc	5.0	ug/L	30 [1]	5.9	nd	nd	nd	nd	nd	23

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial/Industrial Land Use (assuming non-potable groundwater) (Table B-4)

2 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

3 = Aluminum guideline = 5 µg/L at pH<6.5, or 100 µg/L at pH>=6.5

4 = Cadmium guideline [µg/L] = $10^{0.83[\log(\text{hardness})]-2.46}$, for water hardness between 17 and 280 mg/L as CaCO3; For water hardness<17, guideline =0.04; For water hardness>280, guideline =0.37; For unknown water hardness, guideline = 0.04

5 = Copper guideline [µg/L] = $0.2 * e^{0.8545[\ln(\text{hardness})]-1.465}$, for water hardness between 82 and 180 mg/L as $CaCO_3$; If water hardness is <82, guideline = 2; If water hardness is >180, guideline = 4; If water hardness is unknown, guideline = 2

6 = Lead guideline [µg/L] = $e^{1.273[\ln(\text{hardness})]-4.705}$, for water hardness between 60 and 180 mg/L as $CaCO_3$; If water hardness is less than 60, guideline = 1; If water hardness is greater than 180, guideline = 7; If water hardness is unknown, guideline = 1

7 = Nickel guideline [µg/L] = $e^{0.846[\ln(\text{hardness})]+0.0584}$

8 = Based on pH measured at the closest monitor well

RDL = Reportable Detection Limit

nd = Not detected above standard RDL

nd (#) = Not detected above elevated RDL shown

Fld-Dup = Field duplicate sample

"-" = Not analyzed, not applicable or no applicable guideline

Shaded = Value exceeds applicable guideline

Table F.14 Results of Laboratory Analysis of Dissolved Metals in Groundwater

Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment

Site 212, Border Beacon, NL

Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Waste Disposal Sites (2018)					Former Innu Camp (2018)	General Dump Site (2018)
				2018-MW33	2018-MW34	2018-MW37	2018-MW39	2018-MW41	2018-MW46	2018-MW43
Depth to Groundwater (m):				1.96	1.37	1.54	2.15	5.23	3.80	6.44
pH:				6.55	6.24	6.03	5.84	6.59	6.82	6.77
Hardness (mg/L as $CaCO_3$):				3.3	2.6	1.1	1.0	5.4	7	6.4
Aluminium guideline				100	5	5	5	100	100	100
Cadmium guideline				0.040	0.040	0.040	0.040	0.040	0.040	0.040
Lead guideline				1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nickel guideline				2.9	2.4	2.4	1.1	4.4	5.5	5.1
Aluminum	5.0	µg/L	5 - 100 [1,3]	160	67	100	220	12	14	37
Antimony	1.0	µg/L	16,000 [2]	nd	nd	nd	nd	nd	nd	nd
Arsenic	1.0	µg/L	5 [1]	nd	nd	nd	nd	nd	nd	nd
Barium	1.0	µg/L	23,000 [2]	14	15	15	9.8	12	57	23
Beryllium	1.0	µg/L	53 [2]	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Boron	50	µg/L	1,500 [1]	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.010	µg/L	0.04 - 0.37 [1,4]	0.041	0.017	0.021	nd	nd	nd	nd
Calcium	100	µg/L	-	1,300	730	450	250	1,600	2,300	2,000
Chromium	1.0	µg/L	640 [2]	nd	nd	nd	nd	nd	nd	nd
Cobalt	0.40	µg/L	52 [2]	0.72	1.4	1.4	0.48	nd	nd	2.4
Copper	2.0	µg/L	7 [1]	nd	nd	nd	nd	nd	nd	nd
Iron	50	µg/L	300 [1]	330	nd	nd	53	nd	nd	nd
Lead	0.50	µg/L	1 - 7 [1,6]	nd	nd	nd	nd	nd	nd	nd
Magnesium	100	µg/L	-	nd	180	nd	nd	320	320	350
Manganese	2.0	µg/L	-	100	120	170	75	6.4	47	290
Molybdenum	2.0	µg/L	7,300 [2]	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	µg/L	25 - 150 [1,7]	nd	3.6	2.2	nd	nd	nd	nd
Phosphorous	100	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Potassium	100	µg/L	-	270	430	240	110	550	730	670
Selenium	1.0	µg/L	1 [1]	nd	nd	nd	nd	nd	nd	nd
Silver	0.10	µg/L	0.1 [1]	nd	nd	nd	nd	nd	nd	nd
Sodium	100	µg/L	1,800,000 [2]	260	640	330	280	650	1,300	910
Strontium	2.0	µg/L	-	7.8	5.9	3.1	2.8	6.4	14	11
Thallium	0.10	µg/L	400 [2]	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Titanium	2.0	µg/L	-	nd	nd	nd	nd	nd	nd	nd
Uranium	0.10	µg/L	15 [1]	nd	nd	nd	nd	nd	nd	nd
Vanadium	2.0	µg/L	200 [2]	nd	nd	nd	nd	nd	nd	nd
Zinc	5.0	ug/L	30 [1]	6.0	nd	5.1	nd	nd	nd	nd

Notes:

1 = Alberta Groundwater Remediation Guideline Values for Commercial/Industrial Land Use (assuming non-potable groundwater) (Table B-4)

2 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

3 = Aluminum guideline = 5 µg/L at pH<6.5, or 100 µg/L at pH>=6.5

4 = Cadmium guideline [µg/L] = $10^{0.83[\log(\text{hardness})]-2.46}$, for water hardness between 17 and 280 mg/L as CaCO3; For water hardness<17, guideline =0.04; For water hardness>280, guideline =0.37; For unknown water hardness, guideline = 0.04

5 = Copper guideline [µg/L] = $0.2 * e^{0.8545[\ln(\text{hardness})]-1.465}$, for water hardness between 82 and 180 mg/L as $CaCO_3$; If water hardness is <82, guideline = 2; If water hardness is >180, guideline = 4; If water hardness is unknown, guideline = 2

6 = Lead guideline [µg/L] = $e^{1.273[\ln(\text{hardness})]-4.705}$, for water hardness between 60 and 180 mg/L as $CaCO_3$; If water hardness is less than 60, guideline = 1; If water hardness is greater than 180, guideline = 7; If water hardness is unknown, guideline = 1

7 = Nickel guideline [µg/L] = $e^{0.846[\ln(\text{hardness})]+0.0584}$

8 = Based on pH measured at the closest monitor well

RDL = Reportable Detection Limit

nd = Not detected above standard RDL

nd (#) = Not detected above elevated RDL shown

Fld-Dup = Field duplicate sample

"-" = Not analyzed, not applicable or no applicable guideline

Shaded = Value exceeds applicable guideline

Table F.15 Results of Laboratory Analysis of PCBs in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area (2018)		Camp / Antenna Areas and AES Compound (2018)						
				2018-MW47	2018-MW68 (Fld-Dup of 2018-MW47)	2018-MW01	2018-MW09	2018-MW11	2018-MW14	2018-MW17	2018-MW18	2018-MW20
Depth to Groundwater (m):				**4.70**	**-**	**5.73**	**7.74**	**6.93**	**6.83**	**2.97**	**3.53**	**6.49**
Aroclor 1016	0.050	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.050	ug/L		nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.050	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.050	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.050	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.050	ug/L	-	nd	nd	nd	0.23	nd	nd	nd	nd	nd
Aroclor 1260	0.050	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	ug/L	0.2	nd	nd	nd	0.23	nd	nd	nd	nd	nd

Notes:

1 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

RDL = Reportable Detection Limit.
nd = Not detected above RDL.
nd (#) = Not detected above elevated RDL shown
"-" = Not analyzed, not applicable or no applicable guideline
Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
Shaded = Value exceeds applicable guideline

Table F.15 Results of Laboratory Analysis of PCBs in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Camp / Antenna Areas and AES Compound (2018)					Waste Disposal Sites (2018)			
				2018-MW26	2018-MW27	2018-MW31	2018-MW32	2018-MW50	2018-MW33	2018-MW34	2018-MW37	2018-MW39
Depth to Groundwater (m):				2.29	7.93	6.61	7.46	4.35	1.96	1.37	1.54	2.15
Aroclor 1016	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1221	0.050	ug/L		nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1232	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1248	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1242	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1254	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Aroclor 1260	0.050	ug/L	-	nd	nd (0.70)	nd	nd (0.76)	nd	nd	nd	nd	nd
Calculated Total PCB	0.050	ug/L	0.2	nd	*nd (0.70)*	nd	*nd (0.76)*	nd	nd	nd	nd	nd

Notes:

1 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

RDL = Reportable Detection Limit.
nd = Not detected above RDL.
nd (#) = Not detected above elevated RDL shown
"-" = Not analyzed, not applicable or no applicable guideline
Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
Shaded = Value exceeds applicable guideline

Table F.15 Results of Laboratory Analysis of PCBs in Groundwater
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Waste Disposal Sites (2018)	Former Innu Camp (2018)		General Dump Site (2018)
				2018-MW41	2018-MW46	2018-MW46 Lab-Dup	2018-MW43
Depth to Groundwater (m):				5.23	3.80	-	6.44
Aroclor 1016	0.050	ug/L	-	nd	nd	nd	nd
Aroclor 1221	0.050	ug/L		nd	nd	nd	nd
Aroclor 1232	0.050	ug/L	-	nd	nd	nd	nd
Aroclor 1248	0.050	ug/L	-	nd	nd	nd	nd
Aroclor 1242	0.050	ug/L	-	nd	nd	nd	nd
Aroclor 1254	0.050	ug/L	-	nd	nd	nd	nd
Aroclor 1260	0.050	ug/L	-	nd	nd	nd	nd
Calculated Total PCB	0.050	ug/L	0.2	nd	nd	-	nd

Notes:

1 = Ontario Ministry of the Environment (MOE) Groundwater Standards for Use Under Part XV.1 of the Environmental Protection Act (April 2011). Groundwater components for Table 9 - Generic Site, Within 30 m of a Water Body in a Non-Potable Ground Water Condition.

RDL = Reportable Detection Limit.
nd = Not detected above RDL.
nd (#) = Not detected above elevated RDL shown
"-" = Not analyzed, not applicable or no applicable guideline
Lab-Dup = Laboratory duplicate sample
Fld-Dup = Field duplicate sample
Shaded = Value exceeds applicable guideline

Table F.16 Results of Laboratory Analysis of Petroleum Hydrocarbons in Freshwater Sediment
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Sample ID		BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)					Resemblance	Triple silica gel cleanup?[4]
		Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	F3 (C_{16}-C_{32})	Returned to baseline?[2]	Modified TPH[3]		
RDL		0.025	0.025	0.025	0.05	2.5	10	25	-	15	-	-
Tier I ESLs - Aquatic Life[1]		1.2	1.4	1.2	1.3	-	-	-	-	15/25/43	-	-
Lower Site - General Area												
2017	BB-SED1	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	BB-SED1 Lab-Dup	-	-	-	-	-	nd	nd	-	-	-	Y
	BB-SED2	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
Camp / Antenna Areas and AES Compound												
2018	2018-SED07	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	2018-SED08	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	2018-SED10 (Fld Dup of 2018-SED08)	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	2018-SED09	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
Unknown Foundation / Building												
2017	BB-SED9	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	BB-SED9 Lab-Dup	nd	nd	nd	nd	nd	-	-	-	-	-	Y
Waste Disposal Sites												
2017	BB-SED10	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	BB-SED11	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	BB-SED12	nd	nd	nd	nd	nd	nd	83	Yes	83	ULO. LO	Y
2018	2018-SED03	nd	nd	nd	nd	nd	nd	55	Yes	55	PLO	Y
	2018-SED04	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
Former Innu Camp												
2018	2018-SED01	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
	2018-SED01 Lab-Dup	nd	nd	nd	nd	nd	-	-	-	-	-	-
	2018-SED02	nd	nd	nd	nd	nd	nd	30	Yes	30	ULO	Y
General Dump Site												
2018	2018-SED05	nd	nd	nd	nd	nd	nd	nd	-	nd	-	Y
Upper Site												
2017	BB-SED5	nd	nd	nd	nd	nd	28,000	4,900	Yes	33,000	WFOF	Y
	BB-SED51 (Fld Dup of BB-SED5)	nd	nd	nd	nd	nd	4,000	2,000	Yes	5,900	WFOF. PLO	Y

Notes:
1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Sediment Ecological Screening Levels (ESLs) for the Protection of Freshwater and Marine Aquatic Life - Typical sediment type for gasoline/fuel oil/lube oil (July 2012, January 2015).
2= Atlantic Partners in RBCA (Risk-Based Corrective Action) Implementation (PIRI) analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.
3 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).
4 = Triple silica gel cleanup requested to reduce organic interference
Fld-Dup = Field duplicate sample.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = not analyzed, not applicable or no applicable guideline.
Shaded = Value exceeds applicable guideline.
Resemblance:
ULO = Unidentified compounds in lube oil range.
PLO = Possible lube oil fraction.
LO = One product in lube oil range/lube oil fraction
WFOF = Weathered fuel oil fraction.

Table F.17 Results of Laboratory Analysis of PAHs in Freshwater Sediment
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area			Camp / Antenna Areas and AES Compound			Unknown Foundation / Building	Waste Disposal Sites					Former Innu Camp		Upper Site	
				2017			2018			2017	2017			2018		2018		2017	
				BB-SED1	BB-SED1 Lab-Dup	BB-SED2	2018-SED07	2018-SED07 Lab-Dup	2018-SED09	BB-SED9	BB-SED10	BB-SED11	BB-SED12	2018-SED03	2018-SED04	2018-SED01	2018-SED02	BB-SED5	BB-SED51 (Fld Dup of BB-SED5)
1-Methylnaphthalene	0.010	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.021	nd	nd	nd	nd (0.66)	0.21
2-Methylnaphthalene	0.010	mg/kg	0.201 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.024	nd	nd	nd	*nd (0.44)*	0.23
Acenaphthene	0.010	mg/kg	0.0889 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.014	nd	nd	nd	*nd (0.40)*	nd
Acenaphthylene	0.010	mg/kg	0.128 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.28)*	nd
Anthracene	0.010	mg/kg	0.245 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	mg/kg	2.355 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	mg/kg	0.144 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.010	mg/kg	0.391 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	mg/kg	0.515 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	mg/kg	0.875 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)anthracene	0.010	mg/kg	0.385 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	mg/kg	0.782 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	mg/kg	0.17 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*nd (0.43)*	nd
Benzo(j)fluoranthene	0.010	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	mg/kg	0.24 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd (0.070)	nd
Chrysene	0.010	mg/kg	0.862 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	mg/kg	0.135 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	mg/kg	0.2 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.070	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life - Probable Effects Levels for Freshwater Sediment (PEL) (1999 and updates).
2 = Ontario Provincial Sediment Quality Guidelines (2008) Lowest Effects Level (LEL).
Lab-Dup = Laboratory duplicate sample.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
nd (#) = Not detected above elevated RDL shown.
"-" = not analyzed, not applicable or no applicable guideline.
Shaded = Value exceeds the applicable guideline.
Underlined/Italicized = RDL exceeds the applicable guideline.

Table F.18 Results of Laboratory Analysis of Available Metals in Freshwater Sediment
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area			Camp / Antenna Areas and AES Compound				Unknown Foundation / Building	Waste Disposal Sites					Former Innu Camp		General Dump Site		Upper Site	
				2017		2018	2018				2017	2017		2018			2018		2018		2017	
				BB-SED1	BB-SED2	2018-SED06	2018-SED07	2018-SED08	2018-SED10 (Fld Dup of 2018-SED08)	2018-SED09	BB-SED9	BB-SED10	BB-SED11	BB-SED12	2018-SED03	2018-SED04	2018-SED01	2018-SED02	2018-SED05	2018-SED05 Lab-Dup	BB-SED5	BB-SED51 (Fld Dup of BB-SED5)
Aluminum	10	mg/kg	-	4,600	3,900	3,100	3,400	3,000	3,300	3,000	2,700	5,300	5,400	3,700	4,000	2,400	4,100	3,000	5,100	4,900	5,900	5,600
Antimony	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	17 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	-	110	46	41	52	48	58	41	32	25	29	18	23	15	69	14	30	33	170	200
Beryllium	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.3	mg/kg	3.5 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.38
Chromium	2.0	mg/kg	90 [1]	8.1	17	8.7	8.1	3.1	3.2	3.1	5.9	6.2	6.7	4.4	4.6	nd	4.1	2.7	4.4	4.7	9.7	10
Cobalt	1.0	mg/kg	-	2.7	2.7	2.7	2.8	2.4	2.1	2.1	1.6	1.9	2.0	1.4	1.8	1.3	2.0	nd	1.0	1.1	3.1	4.1
Copper	2.0	mg/kg	197 [1]	5.9	5.3	4.1	5.5	4.6	4.7	4.8	3.1	5.6	4.8	13	32	3.0	3.7	nd	2.5	2.6	9.5	14
Iron	50	mg/kg	-	14,000	15,000	20,000	12,000	9,000	9,400	10,000	12,000	12,000	10,000	11,000	12,000	6,400	9,100	7,400	8,700	8,600	8,300	8,100
Lead	0.5	mg/kg	91.3 [1]	5.4	5.4	6.2	5.1	3.7	4.1	4.8	4.6	8.0	7.0	19	45	4.2	10	4.6	6.5	6.8	5.7	30
Lithium	2.0	mg/kg	-	11	11	9.0	9.5	8.7	8.1	8.1	8.6	8.6	8.4	7.9	7.6	7.0	8.2	4.3	3.0	3.7	nd	nd
Manganese	2.0	mg/kg	460 [3]	150	160	150	130	99	110	110	92	100	99	79	87	57	90	53	54	58	32	46
Mercury	0.1	mg/kg	0.486 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.11	0.16
Molybdenum	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2.0	mg/kg	16 [3]	3.8	3.2	3.2	3.4	2.7	2.7	2.7	2.3	3.4	3.4	3.0	3.6	nd	2.3	nd	nd	nd	5.0	7.0
Rubidium	2.0	mg/kg	-	8.9	7.7	4.1	4.3	5.1	5.7	3.4	4.1	5.1	5.7	3.9	4.0	3.0	5.7	2.7	3.8	4	2.6	4.3
Selenium	1.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	2 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	5.0	mg/kg	-	11	5.4	6.2	5.5	nd	5.6	nd	nd	7.5	5.2	nd	nd	nd	6.0	nd	nd	5.2	29	34
Thallium	0.1	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.2
Uranium	0.1	mg/kg	-	1.3	0.96	1.2	0.81	0.48	0.53	0.56	0.79	0.8	0.95	0.52	0.56	0.33	0.75	0.32	0.39	0.38	0.64	0.45
Vanadium	2.0	mg/kg	-	16	18	29	15	6.8	7.0	5.3	16	12	13	11	11	3.5	7.9	5.3	8.3	9.7	9.6	9.8
Zinc	5.0	mg/kg	315 [1]	36	38	32	30	23	24	26	25	35	33	41	47	17	21	10	12	13	98	180

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life - Probable Effects Levels for Freshwater Sediment (PEL) (1999 and updates).
2 = AENV Environmental Quality Guidelines for Alberta Surface Waters (2014) PEL.
3 = Ontario Provinical Sediment Quality Guidelines (2008) Lowest Effects Level (LEL).
Lab-Dup = Laboratory duplicate sample.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = not analyzed, not applicable or no applicable guideline.

Table F.19 Results of Laboratory Analysis of PCBs in Freshwater Sediment
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area		Camp / Antenna Areas and AES Compound		Unknown Foundation / Building	Waste Disposal Sites					Former Innu Camp		General Dump Site	Upper Site	
				2017		2018		2017	2017			2018		2018		2018	2017	
				BB-SED1	BB-SED2	2018-SED08	2018-SED10 (Fld Dup of 2018-SED08)	BB-SED9	BB-SED10	BB-SED11	BB-SED12	2018-SED03	2018-SED04	2018-SED01	2018-SED02	2018-SED05	BB-SED5	BB-SED51 (Fld Dup of BB-SED51)
Aroclor 1016	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1260	0.05	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.05	mg/kg	0.277	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Canadian Sediment Quality Guidelines for the Protection of Aquatic Life - Probable Effects Levels for Marine Sediment (PEL) (1999 and updates).
Lab-Dup = Laboratory duplicate sample.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.20 Results of Laboratory Analysis of Petroleum Hydrocarbons in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Sample ID		BTEX Parameters (mg/L)				Total Petroleum Hydrocarbons (mg/L)					Resemblance
		Benzene	Toluene	Ethyl-benzene	Xylenes	F1 (C_6-C_{10})	F2 (C_{10}-C_{16})	F3 (C_{16}-C_{32})	Returned to baseline?[2]	Modified TPH[3]	
RDL		0.0010	0.0010	0.0010	0.0020	0.010	0.050	0.15	-	0.10	-
Tier I ESLs - Aquatic Life [1]		2.1	0.77	0.32	0.33	-	-	-	-	1.5 / 0.10 / 0.10	-
Lower Site - General Area											
2017	BB-SW1	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	BB-SW1 Lab-Dup	nd	nd	nd	nd	nd	nd	nd	-	-	-
	BB-SW2	nd	nd	nd	nd	nd	nd	nd	-	nd	-
2018	2018-SW06	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW06 Lab-Dup	-	-	-	-	-	nd	nd	-	-	-
Camp / Antenna Areas and AES Compound											
2018	2018-SW07	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW08	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW10 (Fld Dup of 2018-SW08)	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW09	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Unknown Foundation / Building											
2017	BB-SW9	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Waste Disposal Sites											
2017	BB-SW10	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	BB-SW11	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	BB-SW12	nd	0.0010	nd	nd	nd	nd	0.98	Yes	0.98	NR FO/LO
2018	2018-SW03	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW03 Lab-Dup	-	-	-	-	-	nd	nd	-	-	-
	2018-SW04	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Former Innu Camp											
2018	2018-SW01	nd	nd	nd	nd	nd	nd	nd	-	nd	-
	2018-SW02	nd	nd	nd	nd	nd	nd	nd	-	nd	-
General Dump Site											
2018	2018-SW05	nd	nd	nd	nd	nd	nd	nd	-	nd	-
Upper Site											
2017	BB-SW5	nd	nd	nd	nd	nd	nd	nd	-	nd	-

Notes:
1 = Atlantic Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Ecological Screening Levels (ESLs) for the Protection of Freshwater and Marine Aquatic Life (Table 3a), Surface Water guidelines for gasoline/diesel/lube oil (July 2012. revised January 2015).
2 =Atlantic Partnership in RBCA Implementation analytical method does not analyze for >C_{32}. Laboratory certificate indicates (Yes or No) whether chromatogram for each sample returns to baseline after C_{32}. Samples are considered to have returned to baseline if the area from C_{32}-C_{36} is less than 10% of the area from C_{10}-C_{32}.
3 = Modified TPH = TPH C_6 - C_{32} (excluding BTEX).
Lab-Dup = Laboratory duplicate sample.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.
Shaded = Value exceeds applicable guideline.
Resemblance:
NR FO/LO = No resemblance to petroleum products in fuel/lube oil range.

Table F.21 Results of Laboratory Analysis of General Chemistry in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area			Camp / Antenna Areas and AES Compound				Unknown Foundation / Building	Waste Disposal Sites						Former Innu Camp		General Dump Site	Upper Site	
				2017		2018	2018				2017	2017				2018		2018		2018	2017	
				BB-SW1	BB-SW2	2018-SW06	2018-SW07	2018-SW08	2018-SW10 (Fld Dup of 2018-SW08)	2018-SW09	BB-SW9	BB-SW10	BB-SW11	BB-SW11 Lab-Dup	BB-SW12	2018-SW03	2018-SW04	2018-SW01	2018-SW02	2018-SW05	BB-SW5	BB-SW5 Lab-Dup
Calculated Parameters																						
Anion Sum	N/A	me/L	-	0.19	0.17	0.24	0.19	0.2	0.21	0.22	0.12	0.00	0.00	-	0.00	0.00	0.03	0.19	0.00	0.17	0.00	-
Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	-	9.5	8.2	9.8	7.6	7.9	8.5	8.7	6.0	nd	nd	-	nd	nd	nd	9.3	nd	6.0	nd	-
Calculated TDS	1	mg/L	-	13	12	15	13	13	13	13	9.0	1.0	2.0	-	11	nd	1.0	14	nd	8.0	5.0	-
Carb. Alkalinity (calc. as CaCO3)	1	mg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	-
Cation Sum	N/A	me/L	-	0.18	0.16	0.21	0.17	0.18	0.16	0.16	0.11	0.04	0.03	-	0.44	0.01	0.01	0.22	0.02	0.02	0.09	-
Hardness (CaCO3)	1	mg/L	-	6.7	6.1	8.1	6.2	6.7	6.1	5.9	3.7	nd	nd	-	6.6	nd	nd	8.5	nd	nd	3.5	-
Ion Balance (% Difference)	N/A	%	-	2.7	3.03	6.67	5.56	5.26	13.5	15.8	4.35	100	100	-	100	100	50	7.32	100	79	100	-
Langelier Index (@ 20C)		N/A	-	-3.18	-3.33	-2.17	-3.07	-3.22	-3.09	-3.17	-3.83	-	-	-	-	-	-	-2.86	-	-5.08	-	-
Langelier Index (@ 4C)		N/A	-	-3.43	-3.58	-2.42	-3.32	-3.47	-3.34	-3.42	-4.08	-	-	-	-	-	-	-3.11	-	-5.34	-	-
Saturation pH (@ 20C)		N/A	-	9.96	10.1	9.86	10.1	10.1	10.1	10.1	10.4	-	-	-	-	-	-	9.86	-	11.3	-	-
Saturation pH (@ 4C)		N/A	-	10.2	10.3	10.1	10.3	10.3	10.3	10.3	10.7	-	-	-	-	-	-	10.1	-	11.6	-	-
Inorganics																						
Total Alkalinity (Total as CaCO3)	5	mg/L	20[1, 6]	9.5	8.2	9.9	7.6	7.9	8.6	8.8	6.0	nd	nd	-	nd	nd	nd	9.3	nd	6.0	nd	nd
Dissolved Chloride (Cl)	1	mg/L	120[3]	nd	nd	1.5	1.4	1.6	1.5	1.5	nd	nd	nd	-	nd	nd	1.0	nd	nd	1.4	nd	nd
Colour	5	TCU	narrative[3,4]	7.1	5.5	6.1	13	12	12	11	nd	nd	nd	-	nd	nd	nd	7.1	9.2	21	44	44
Nitrate + Nitrite	0.05	mg/L	400[7]	nd	0.15	nd	nd	nd	nd	nd	0.073	nd	nd	-	nd	nd	nd	nd	nd	0.066	nd	nd
Nitrogen (Ammonia Nitrogen)	0.05	mg/L	-	nd	nd	nd	nd	nd	nd	nd	0.055	nd	nd	-	nd	nd	nd	nd	0.06	0.095	nd	-
Total Organic Carbon (C)	0.5	mg/L	-	3.2	2.5	1.4	2.1	2.1	2.2	2.1	3.8	5.6	2.8	-	18	0.51	nd	1.5	3.6	80	13	-
Orthophosphate (P)	0.01	mg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	0.012	nd	nd
pH	N/A	pH	6.5 - 9.0[3]	6.78	6.73	7.69	7.03	6.84	6.97	6.89	6.59	5.93	6.18	6.06	5.69	6.06	6.2	7.01	6.22	6.22	6.38	-
Reactive Silica (SiO2)	0.5	mg/L	-	3.7	3.0	3.4	3.2	3.2	3.2	3.2	2.6	nd	1.1	-	nd	nd	nd	3.5	nd	1.8	3.1	3.1
Dissolved Sulphate (SO4)	2	mg/L	218/309[1,2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	nd	nd	nd	nd	nd	nd	nd	nd
Turbidity	0.1	NTU	narrative[3,5]	0.55	0.34	0.21	0.35	0.13	0.59	0.29	0.59	1.9	0.86	-	170	0.29	0.19	0.28	0.45	560	0.6	-
Conductivity	1	uS/cm	-	19	15	25	17	16	17	16	9.0	2.8	5.1	4.9	9.1	2.3	1.5	23	3.4	14	13	-

Notes:
1 = Alberta Environmental Quality Guidelines for Alberta Surface Waters (2014).
2 = Varies with water hardness. For hardness < 30 mg/L, gudeline = 128 mg/L; for hardness between 31 and 75 mg/L, guideline = 218 mg/L; for hardness between 76 and 180 mg/L, guideline = 218 mg/L; for hardness between 181 and 250 mg/L, guideline = 429 mg/L; and, for hardness > 250 mg/L, guideline determined based on site water (not known).
3 = CCME Water Quality Guidelines for the Protection of Freshwater Aquatic Life.
4 = CCME guideline for colour is narrative: the mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration. The seasonally adjusted expected value of the system under consideration is not known.
5 = CCME guideline for turbidity is narrative: maximum increase of 8 NTUs from background levels when background levels are between 8 and 80 NTUs. Background levels of turbidity are not known.
6 = Total Alkalinity guideline is a minumum value.
7 = British Columbia Ministry of the Environment Contaminated Sites Regulation Schedule 6 : Generic Numerical Water Standards: Aquatic Life.
Lab-Dup = Laboratory duplicate sample.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = not analyzed, not applicable or no applicable guideline.
Shaded = Value exceed applicable guideline.

Table F.22 Results of Laboratory Analysis of VOCs in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Volatile Organics	RDL	Units	Guideline	Lower Site - General Area		Unknown Foundation / Building	Waste Disposal Sites			Former Innu Camp			General Dump Site	Upper Site
				2017		2017	2017			2018			2018	2017
				BB-SW1	BB-SW2	BB-SW9	BB-SW10	BB-SW11	BB-SW12	2018-SW01	2018-SW01 Lab-Dup	2018-SW02	2018-SW05	BB-SW5
Chlorobenzenes														
1,2-Dichlorobenzene	0.5	µg/L	0.7 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	1	µg/L	150 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	1	µg/L	26 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	1	µg/L	1.3 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Volatile Organics														
1,1,1-Trichloroethane	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	2	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethylene	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	1	µg/L	100 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzene	1	µg/L	2,100 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromodichloromethane	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromoform	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bromomethane	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Carbon Tetrachloride	0.5	µg/L	13.3 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroethane	8	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	1	µg/L	1.8 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloromethane	8	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethylene	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibromochloromethane	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	1	µg/L	320 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ethylene Dibromide	0.2	µg/L		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Methylene Chloride(Dichloromethane)	3	µg/L	98.1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
o-Xylene	1	µg/L	330 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
p+m-Xylene	2	µg/L	330 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Styrene	1	µg/L	72 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethylene	1	µg/L	110 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Toluene	1	µg/L	770 [3]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethylene	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethylene	1	µg/L	21 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane (FREON 11)	8	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl Chloride	0.5	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the protection of freshwater aquatic life (1999 and updates).
2 = Alberta Environmental Quality Guidelines for Alberta Surface Waters (2014).
3 = Atlantic RBCA Tier I Surface Water Ecological Screening Levels (ESLs) for the Protection of Freshwater and Marine Aquatic Life (Table 3a) (July 2012, revised January 2015).
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd = not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.23 Results of Laboratory Analysis of PAHs in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area		Unknown Foundation / Building	Waste Disposal Sites			Former Innu Camp		General Dump Site	Upper Site
				2017		2017	2017			2018		2018	2017
				BB-SW1	BB-SW2	BB-SW9	BB-SW10	BB-SW11	BB-SW12	2018-SW01	2018-SW02	2018-SW05	BB-SW5
1-Methylnaphthalene	0.050	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	0.050	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthene	0.010	µg/L	5.8 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Anthracene	0.010	µg/L	0.012 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)anthracene	0.010	µg/L	0.018 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.010	µg/L	0.015 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(g,h,i)perylene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(j)fluoranthene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chrysene	0.010	µg/L	1 [2]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Dibenzo(a,h,)anthracene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluoranthene	0.010	µg/L	0.04 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Fluorene	0.010	µg/L	3 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-c,d) pyrene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Naphthalene	0.20	µg/L	1.1 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Perylene	0.010	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Phenanthrene	0.010	µg/L	0.4 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Pyrene	0.010	µg/L	0.025 [1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the protection of freshwater aquatic life (1999 and updates).
2 = British Columbia Ministry of the Environment Contaminated Sites Regulation Schedule 6 : Generic Numerical Water Standards: Aquatic Life.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.24 Results of Laboratory Analysis of Total Metals in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area			Camp / Antenna Areas and AES Compound				Unknown Foundation / Building	Waste Disposal Sites					Former Innu Camp		General Dump Site	Upper Site
				2017		2018	2018				2017	2017			2018		2018		2018	2017
				BB-SW1	BB-SW2	2018-SW06	2018-SW07	2018-SW08	2018-SW10 (Fld Dup of 2018-SW08)	2018-SW09	BB-SW9	BB-SW10	BB-SW11	BB-SW12	2018-SW03	2018-SW04	2018-SW01	2018-SW02	2018-SW05	BB-SW5
pH[2]:				6.78	6.73	7.69	7.03	6.84	6.97	6.89	6.59	5.93	6.18	5.69	6.06	6.20	7.01	6.22	6.22	6.38
Hardness (mg/L as $CaCO_3$)[2]:				6.7	6.1	8.1	6.2	6.7	6.1	5.9	3.7	0.5	0.5	6.6	0.5	0.5	8.5	0.5	0.5	3.5
Aluminum Guideline[3]				100	100	100	100	100	100	100	100	5	5	5	5	5	100	5	5	5
Cadmium Guideline[4]				0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Copper Guideline[5]				2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Lead Guideline[6]				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nickel Guideline[7]				25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Aluminum	5	µg/L	5 - 100[1,3]	28	110	51	150	190	74	45	160	450	59	6,000	21	74	36	150	17	180
Antimony	1	µg/L	200[8]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	1	µg/L	5[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.4	nd	nd	nd	nd	nd	nd
Barium	1	µg/L	10,000[8]	21	21	32	16	17	18	14	19	2.6	2.8	29	1.2	nd	36	5.7	1.3	12
Beryllium	1	µg/L	56[8]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Bismuth	2	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	50	µg/L	1,500[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	0.01	µg/L	0.04 - 0.37[1,4]	nd	nd	0.038	0.018	0.018	0.035	nd	nd	nd	0.022	0.91	0.12	nd	nd	nd	0.12	0.03
Calcium	100	µg/L	-	2,100	1,900	2,600	1,900	2,100	1,900	1,900	1,200	130	280	1,200	170	110	2,700	160	150	1,000
Chromium	1	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.3	7	nd	nd	nd	nd	nd	nd
Cobalt	0.4	µg/L	2.5[9]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.2	nd	nd	nd	nd	nd	0.4
Copper	2	µg/L	2 - 4[1,5]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	38	4.5	nd	nd	nd	3.3	nd
Iron	50	µg/L	300[1]	nd	100	78	280	380	160	110	230	640	71	8,000	140	71	65	140	140	95
Lead	0.5	µg/L	1 - 7[1,6]	nd	nd	nd	nd	0.6	nd	nd	nd	1.2	nd	38	1.7	0.56	nd	0.97	1.6	nd
Magnesium	100	µg/L	-	330	300	380	330	380	310	290	180	nd	nd	860	nd	nd	390	nd	nd	220
Manganese	2	µg/L	-	2.3	3.1	7.6	11	12	8.6	7.7	8	4.8	2.9	44	8.4	3.4	6.8	3.1	9	11
Molybdenum	2	µg/L	73[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	2	µg/L	25 - 150[1,7]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.2	nd	nd	nd	nd	nd	nd
Phosphorous	100	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	840	nd	nd	nd	nd	nd	nd
Potassium	100	µg/L	-	290	260	380	320	320	280	290	170	nd	120	430	nd	nd	390	nd	nd	nd
Selenium	1	µg/L	1[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.1	µg/L	0.25[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.13	nd	nd	nd	nd	nd	nd
Sodium	100	µg/L	-	790	680	700	640	670	640	630	450	150	240	280	nd	nd	850	nd	nd	310
Strontium	2	µg/L	-	13	11	15	11	12	11	12	8.6	nd	nd	6.3	nd	nd	16	nd	nd	7.8
Thallium	0.1	µg/L	0.8[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tin	2	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Titanium	2	µg/L	1,000[8]	nd	4.8	2.5	9.1	13	2.7	nd	14	29	3.9	390	nd	nd	nd	6.2	nd	2.3
Uranium	0.1	µg/L	15[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.88	nd	nd	nd	nd	nd	nd
Vanadium	2	µg/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	8.3	nd	nd	nd	nd	nd	nd
Zinc	5	ug/L	30[1]	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	54	9.2	nd	nd	17	9.2	39

Notes:
1 = Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Freshwater Aquatic Life (1999 and updates).
2 = From Table F.21.
3 = Aluminum guideline = 5 µg/L at pH<6.5, or 100 µg/L at pH>=6.5.
4 = Cadmium guideline [µg/L] = $10^{0.83[\log(\text{hardness})]-2.46}$, for water hardness between 17 and 280 mg/L as CaCO3.
5 = Copper guideline [µg/L] = $0.2 * e^{0.8545[\ln(\text{hardness})]-1.465}$, for water hardness between 82 and 180 mg/L as $CaCO_3$.
6 = Lead guideline [µg/L] = $e^{1.273[\ln(\text{hardness})]-4.705}$, for water hardness between 60 and 180 mg/L as $CaCO_3$.
7 = Nickel guideline [µg/L] = $e^{0.76[\ln(\text{hardness})]+1.06}$, for hardness between 60 and 180 mg/L as $CaCO_3$.
8 = Alberta Environmental Quality Guidelines for Alberta Surface Waters (2014).
9 = British Columbia Ministry of the Environment Contaminated Sites Regulation Schedule 6 : Generic Numerical Water Standards: Aquatic Life.
Fld-Dup = Field duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.
Shaded = Value exceed applicable guideline.

Table F.25 Results of Laboratory Analysis of PCBs in Surface Water
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area		Unknown Foundation / Building	Waste Disposal Sites			Former Innu Camp		General Dump Site	Upper Site
				2017		2017	2017			2018		2018	2017
				BB-SW1	BB-SW2	BB-SW9	BB-SW10	BB-SW11	BB-SW12	2018-SW01	2018-SW02	2018-SW05	BB-SW5
Aroclor 1016	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1221	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1232	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1248	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1242	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1254	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Aroclor 1260	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Calculated Total PCB	0.05	ug/L	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Notes:
RDL = Reportable Detection Limit.
nd = Not detected above RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.26 Results of Laboratory Analysis of Available Metals in Vegetation
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline[1]	Lower Site - General Area			Camp / Antenna Areas and AES Compound		Waste Disposal Sites				Former Innu Camp	General Dump Site		Upper Site				
				2017	2018		2018		2017		2018		2018	2018		2017		2018		
				BB-VEG1	2018-VEG08	2018-VEG08 Lab-Dup	2018-VEG01	2018-VEG02	BB-VEG4	BB-VEG5	2018-VEG05	2018-VEG06	2018-VEG07	2018-VEG03	2018-VEG04	BB-VEG8	BB-VEG8 Lab-Dup	2018-VEG09	2018-VEG10	2018-VEG11
Aluminum	10	mg/kg	-	260	58	57	15	110	830	3,000	nd	49	68	120	12	400	500	97	340	810
Antimony	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barium	5.0	mg/kg	-	31	18	18	26	110	62	74	28	28	43	64	38	120	130	56	56	70
Beryllium	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Boron	5.0	mg/kg	-	nd	7.3	7.5	29	5.7	nd	nd	7.1	18	9.3	11	30	8.6	8.8	15	5.4	8.9
Cadmium	0.3	mg/kg	-	nd	nd	nd	nd	nd	nd	6.0	nd	nd	nd	nd	nd	0.69	0.82	3.8	0.59	1.1
Chromium	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	2.9	nd	nd	nd	nd	nd	nd	nd	nd	nd	3.8
Cobalt	1.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.1	nd	nd	nd
Copper	2.0	mg/kg	-	2.6	9.1	9.1	8.9	5.6	4.2	9.0	9.2	18	8.3	5.2	9.6	7.3	7.6	6.0	33	130
Iron	50	mg/kg	-	470	130	120	79	160	1,600	2,900	64	130	130	99	62	710	970	140	640	2,000
Lead	0.5	mg/kg	-	nd	nd	0.68	nd	1.8	2.0	7.7	0.56	0.85	11	0.68	1.2	1.1	1.4	1.6	5.1	12
Lithium	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	2.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Manganese	2.0	mg/kg	-	130	600	600	79	370	85	120	590	300	130	150	210	290	310	310	87	130
Mercury	0.03	mg/kg	-	-	nd	-	nd	nd	-	-	nd	nd	nd	nd	nd	-	-	nd	nd	nd
Molybdenum	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	5.4	nd	nd	nd	nd	nd	nd	nd	nd	8.2	2.2
Nickel	2.0	mg/kg	-	2.2	2.9	2.8	nd	3.3	nd	4.1	3.4	5.0	2.4	2.1	2.1	nd	2.0	nd	nd	2.1
Selenium	2.0	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Silver	0.5	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.61
Strontium	5.0	mg/kg	-	12	7.4	7.0	20	23	12	13	11	14	12	25	10	22	26	13	10	11
Thallium	0.1	mg/kg	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	0.1	mg/kg	-	nd	nd	nd	nd	nd	nd	0.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vanadium	2.0	mg/kg	-	nd	nd	nd	nd	nd	2.1	2.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc	5.0	mg/kg	-	16	150	150	94	70	39	280	270	52	97	120	240	370	420	150	170	260

Notes:
1 = No applicable guideline for metals in vegetation.
Lab-Dup = Laboratory duplicate sample.
RDL = Reportable Detection Limit.
nd = Not detected above standard RDL.
"-" = Not analyzed, not applicable or no applicable guideline.

Table F.27 Results of Laboratory Analysis of PCBs in Vegetation
Phase III Environmental Site Assessment and Human Health and Ecological Risk Assessment
Site 212, Border Beacon, NL
Stantec Project No. 121414998

Parameters	RDL	Units	Guideline	Lower Site - General Area		Camp / Antenna Areas and AES Compound		Waste Disposal Sites				Former Innu Camp	General Dump Site		Upper Site			
				2017	2018	2018		2017		2018		2018	2018		2017	2018		
				BB-VEG1	2018-VEG08	2018-VEG01	2018-VEG02	BB-VEG4	BB-VEG5	2018-VEG05	2018-VEG06	2018-VEG07	2018-VEG03	2018-VEG04	BB-VEG8	2018-VEG09	2018-VEG10	2018-VEG11
Aroclor 1016	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1221	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1232	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1248	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1242	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1254	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	0.15	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Aroclor 1260	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	nd	nd	nd	nd	nd	nd	nd (0.25)	nd (0.25)	nd (0.25)	nd (0.25)
Calculated Total PCB	0.050	µg/g	-	nd (0.25)	nd	nd	nd	nd (0.15)	0.15	nd	nd	nd	nd	nd	nd (0.25)	nd	nd	nd

Notes:
1 = No applicable guideline for PCBs in vegetation.
RDL = Reportable Detection Limit.
nd = Not detected above the standard RDL.
nd (#) = Not detected above elevated RDL shown.
mbgs = metres below ground surface.
"-" = Not applicable or no applicable guideline.

APPENDIX G

Laboratory Analytical Reports and Chain of Custody Documentation

Maxxam
A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33417, D33418, D33419, D33420

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/01
Report #: R5331112
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1520
Received: 2018/07/18, 10:08

Sample Matrix: Soil
Samples Received: 35

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	10	N/A	2018/07/24	N/A	Auto Calc.
TEH in Soil (AA PIRI)	1	2018/07/23	2018/07/27	ATL SOP 00116	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	25	2018/07/23	2018/07/24	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	3	2018/07/23	2018/07/25	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	3	2018/07/24	2018/07/25	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	1	2018/07/24	2018/07/27	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	1	2018/07/20	2018/07/20	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	1	2018/07/24	2018/07/24	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	9	2018/07/24	2018/07/25	ATL SOP 00058	EPA 6020A R1 m
Moisture	4	N/A	2018/07/20	ATL SOP 00001	OMOE Handbook 1983 m
Moisture	30	N/A	2018/07/23	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	10	2018/07/23	2018/07/24	ATL SOP 00102	EPA 8270D 2014 m
PCBs in soil by GC/ECD (1)	1	2018/07/23	2018/07/24	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	1	N/A	2018/07/24	N/A	Auto Calc.
VPH in Soil (PIRI) (2)	4	2018/07/19	2018/07/29	ATL SOP 00119	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	9	N/A	2018/07/24	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	19	N/A	2018/07/25	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	4	N/A	2018/07/30	N/A	Atl. RBCA v3.1 m
ModTPH (T2) Calc. for Soil	1	N/A	2018/08/01	N/A	Atl. RBCA v3 m
VPH in Soil (PIRI2) - Field Preserved (3)	1	N/A	2018/07/31	ATL SOP 00120	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	8	N/A	2018/07/21	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	14	N/A	2018/07/22	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	5	N/A	2018/07/23	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	1	N/A	2018/07/24	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All

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Maxxam
A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33417, D33418, D33419, D33420

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/01
Report #: R5331112
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1520
Received: 2018/07/18, 10:08

data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Sample(s) were not field preserved for VPH when received at the laboratory. Analytical results for VPH parameters should be regarded as minimum values.
(3) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Maxxam
01 Aug 2018 14:40:47

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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

Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGK233		HGK234		HGK235			
Sampling Date		2018/07/13		2018/07/13		2018/07/13			
COC Number		D33417		D33417		D33417			
	UNITS	**2018-BH07-GP01**	**QC Batch**	**2018-BH07-GP05**	**QC Batch**	**2018-BH25-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	15	5642233	15	5638054	15	1.0	5642233	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK235	HGK236	HGK237	HGK238	HGK239			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13			
COC Number		D33417	D33417	D33417	D33417	D33417			
	UNITS	**2018-BH25-GP01 Lab-Dup**	**2018-BH25-GP07**	**2018-BH67-GP07**	**2018-BH24-GP01**	**2018-BH24-GP07**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	13	12	13	17	19	1.0	5642233	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HGK240		HGK241	HGK242	HGK287			
Sampling Date		2018/07/13		2018/07/13	2018/07/13	2018/07/13			
COC Number		D33417		D33417	D33417	D33418			
	UNITS	**2018-BH23-GP01**	**QC Batch**	**2018-BH22-GP01**	**2018-BH22-GP07**	**2018-MW20-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	15	5638054	4.4	20	16	1.0	5642233	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK288	HGK289	HGK290	HGK291	HGK292	HGK293			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13			
COC Number		D33418	D33418	D33418	D33418	D33418	D33418			
	UNITS	**2018-MW20-GP08**	**2018-MW26-GP08**	**2018-SS30**	**2018-SS31**	**2018-SS32**	**2018-SS33**	**RDL**	**QC Batch**	**MDL**
Inorganics										
Moisture	%	18	17	19	15	16	19	1.0	5642233	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGK294	HGK295	HGK296	HGK356		HGK357	HGK357			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13		2018/07/13	2018/07/13			
COC Number		D33418	D33418	D33418	D33419		D33419	D33419			
	UNITS	**2018-SS34**	**2018-SS35**	**2018-SS36**	**2018-SS37**	**QC Batch**	**2018-SS38**	**2018-SS38 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	33	20	22	19	5642233	36	38	1.0	5642641	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HGK358	HGK359	HGK360	HGK361	HGK362	HGK363	HGK364			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13			
COC Number		D33419	D33419	D33419	D33419	D33419	D33419	D33419			
	UNITS	**2018-SS39**	**2018-SS40**	**2018-SS41**	**2018-SS42**	**2018-SS43**	**2018-SS44**	**2018-SS45**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	49	38	18	29	11	34	34	1.0	5642641	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK365		HGK396		HGK397		HGK399			
Sampling Date		2018/07/13		2018/07/13		2018/07/13		2018/07/13			
COC Number		D33419		D33420		D33420		D33420			
	UNITS	**2018-SS46**	**QC Batch**	**2018-SS47**	**QC Batch**	**2018-SS48**	**QC Batch**	**2018-AP1-BS2**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	30	5642641	32	5638054	31	5642641	2.7	1.0	5638054	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK400			
Sampling Date		2018/07/13			
COC Number		D33420			
	UNITS	**2018-AP2-BS1**	**RDL**	**QC Batch**	**MDL**
Inorganics					
Moisture	%	7.3	1.0	5642641	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGK238	HGK291		HGK293		HGK361			
Sampling Date		2018/07/13	2018/07/13		2018/07/13		2018/07/13			
COC Number		D33417	D33418		D33418		D33419			
	UNITS	**2018-BH24-GP01**	**2018-SS31**	**QC Batch**	**2018-SS33**	**QC Batch**	**2018-SS42**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	5400	9000	5644055	6400	5643978	9100	10	5644055	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Barium (Ba)	mg/kg	29	140	5644055	63	5643978	89	5.0	5644055	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	5644055	<50	5643978	<50	50	5644055	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	5644055	<0.30	5643978	<0.30	0.30	5644055	N/A
Acid Extractable Chromium (Cr)	mg/kg	5.6	32	5644055	19	5643978	26	2.0	5644055	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.2	6.5	5644055	3.9	5643978	4.3	1.0	5644055	N/A
Acid Extractable Copper (Cu)	mg/kg	4.3	18	5644055	8.7	5643978	12	2.0	5644055	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	20000	5644055	15000	5643978	17000	50	5644055	N/A
Acid Extractable Lead (Pb)	mg/kg	12	8.8	5644055	5.9	5643978	6.7	0.50	5644055	N/A
Acid Extractable Lithium (Li)	mg/kg	7.2	8.0	5644055	7.1	5643978	7.3	2.0	5644055	N/A
Acid Extractable Manganese (Mn)	mg/kg	110	190	5644055	160	5643978	120	2.0	5644055	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	5644055	<0.10	5643978	<0.10	0.10	5644055	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.0	13	5644055	7.3	5643978	8.3	2.0	5644055	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.6	16	5644055	13	5643978	7.0	2.0	5644055	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	5644055	<1.0	5643978	<1.0	1.0	5644055	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	5644055	<0.50	5643978	<0.50	0.50	5644055	N/A
Acid Extractable Strontium (Sr)	mg/kg	5.2	13	5644055	8.6	5643978	11	5.0	5644055	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	0.14	5644055	<0.10	5643978	<0.10	0.10	5644055	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	5644055	<2.0	5643978	<2.0	2.0	5644055	N/A
Acid Extractable Uranium (U)	mg/kg	0.53	0.63	5644055	0.41	5643978	0.41	0.10	5644055	N/A
Acid Extractable Vanadium (V)	mg/kg	12	36	5644055	28	5643978	34	2.0	5644055	N/A
Acid Extractable Zinc (Zn)	mg/kg	25	61	5644055	33	5643978	110	5.0	5644055	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGK362	HGK363	HGK364		HGK365			
Sampling Date		2018/07/13	2018/07/13	2018/07/13		2018/07/13			
COC Number		D33419	D33419	D33419		D33419			
	UNITS	**2018-SS43**	**2018-SS44**	**2018-SS45**	**RDL**	**2018-SS46**	**RDL**	**QC Batch**	**MDL**
Metals									
Acid Extractable Aluminum (Al)	mg/kg	9400	7200	8100	10	100000	100	5644055	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	57	2.0	5644055	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	2.0	5.6	2.0	5644055	N/A
Acid Extractable Barium (Ba)	mg/kg	110	98	99	5.0	120	5.0	5644055	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	<2.0	2.0	5644055	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	2.0	280	20	5644055	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	120	50	5644055	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	0.30	4.3	0.30	5644055	N/A
Acid Extractable Chromium (Cr)	mg/kg	30	22	23	2.0	170	2.0	5644055	N/A
Acid Extractable Cobalt (Co)	mg/kg	5.7	3.8	4.6	1.0	11	1.0	5644055	N/A
Acid Extractable Copper (Cu)	mg/kg	19	19	25	2.0	48000	200	5644055	N/A
Acid Extractable Iron (Fe)	mg/kg	20000	15000	17000	50	74000	50	5644055	N/A
Acid Extractable Lead (Pb)	mg/kg	6.7	48	84	0.50	2100	0.50	5644055	N/A
Acid Extractable Lithium (Li)	mg/kg	8.7	5.3	6.3	2.0	4.2	2.0	5644055	N/A
Acid Extractable Manganese (Mn)	mg/kg	160	120	140	2.0	1400	2.0	5644055	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	0.10	<0.10	0.10	5644055	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	2.4	2.0	5644055	N/A
Acid Extractable Nickel (Ni)	mg/kg	12	7.0	8.4	2.0	510	2.0	5644055	N/A
Acid Extractable Rubidium (Rb)	mg/kg	14	11	12	2.0	5.1	2.0	5644055	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	1.0	240	1.0	5644055	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	150	5.0	5644055	N/A
Acid Extractable Strontium (Sr)	mg/kg	14	11	12	5.0	24	5.0	5644055	N/A
Acid Extractable Thallium (Tl)	mg/kg	0.12	0.10	0.10	0.10	0.11	0.10	5644055	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	2.0	1500	20	5644055	N/A
Acid Extractable Uranium (U)	mg/kg	0.71	0.42	0.46	0.10	0.43	0.10	5644055	N/A
Acid Extractable Vanadium (V)	mg/kg	37	32	36	2.0	20	2.0	5644055	N/A
Acid Extractable Zinc (Zn)	mg/kg	40	57	76	5.0	4600	5.0	5644055	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGK396		HGK397	HGK398			
Sampling Date		2018/07/13		2018/07/13	2018/07/13			
COC Number		D33420		D33420	D33420			
	UNITS	**2018-SS47**	**QC Batch**	**2018-SS48**	**2018-AP1-BS1**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	7300	5638976	8600	5500	10	5644055	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	5638976	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	5638976	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Barium (Ba)	mg/kg	140	5638976	94	20	5.0	5644055	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	5638976	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	5638976	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Boron (B)	mg/kg	<50	5638976	<50	<50	50	5644055	N/A
Acid Extractable Cadmium (Cd)	mg/kg	0.62	5638976	0.41	<0.30	0.30	5644055	N/A
Acid Extractable Chromium (Cr)	mg/kg	30	5638976	26	4.4	2.0	5644055	N/A
Acid Extractable Cobalt (Co)	mg/kg	6.6	5638976	5.4	1.5	1.0	5644055	N/A
Acid Extractable Copper (Cu)	mg/kg	180	5638976	68	15	2.0	5644055	N/A
Acid Extractable Iron (Fe)	mg/kg	18000	5638976	21000	10000	50	5644055	N/A
Acid Extractable Lead (Pb)	mg/kg	31	5638976	15	6.5	0.50	5644055	N/A
Acid Extractable Lithium (Li)	mg/kg	6.4	5638976	8.5	8.2	2.0	5644055	N/A
Acid Extractable Manganese (Mn)	mg/kg	160	5638976	190	97	2.0	5644055	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	5638976	<0.10	<0.10	0.10	5644055	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	5638976	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Nickel (Ni)	mg/kg	12	5638976	8.7	2.2	2.0	5644055	N/A
Acid Extractable Rubidium (Rb)	mg/kg	13	5638976	14	4.6	2.0	5644055	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	5638976	<1.0	<1.0	1.0	5644055	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	5638976	<0.50	<0.50	0.50	5644055	N/A
Acid Extractable Strontium (Sr)	mg/kg	14	5638976	14	<5.0	5.0	5644055	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	5638976	0.14	<0.10	0.10	5644055	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	5638976	27	<2.0	2.0	5644055	N/A
Acid Extractable Uranium (U)	mg/kg	0.57	5638976	0.65	0.53	0.10	5644055	N/A
Acid Extractable Vanadium (V)	mg/kg	38	5638976	40	8.8	2.0	5644055	N/A
Acid Extractable Zinc (Zn)	mg/kg	380	5638976	140	40	5.0	5644055	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGK233				HGK233			
Sampling Date		2018/07/13				2018/07/13			
COC Number		D33417				D33417			
	UNITS	**2018-BH07-GP01**	**RDL**	**QC Batch**	**MDL**	**2018-BH07-GP01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Acenaphthene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Acenaphthylene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Anthracene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	5636685	N/A				
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Chrysene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Fluoranthene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Fluorene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Naphthalene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Perylene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Phenanthrene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Pyrene	mg/kg	<0.010	0.010	5642877	N/A	<0.010	0.010	5642877	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	96		5642877		103		5642877	
D14-Terphenyl (FS)	%	97		5642877		104		5642877	
D8-Acenaphthylene	%	97		5642877		98		5642877	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGK290		HGK292		HGK294		HGK356			
Sampling Date		2018/07/13		2018/07/13		2018/07/13		2018/07/13			
COC Number		D33418		D33418		D33418		D33419			
	UNITS	**2018-SS30**	**RDL**	**2018-SS32**	**RDL**	**2018-SS34**	**RDL**	**2018-SS37**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Acenaphthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Anthracene	mg/kg	<0.010	0.010	<0.020 (1)	0.020	<0.010	0.010	<0.020 (1)	0.020	5642877	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	0.073	0.010	5642877	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Fluorene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642877	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.050 (1)	0.050	5642877	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	0.023	0.010	5642877	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	93		89		86		83		5642877	
D14-Terphenyl (FS)	%	94		100		96		108		5642877	
D8-Acenaphthylene	%	96		100		93		90		5642877	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGK357	HGK358	HGK359	HGK360	HGK400			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13	2018/07/13			
COC Number		D33419	D33419	D33419	D33419	D33420			
	UNITS	**2018-SS38**	**2018-SS39**	**2018-SS40**	**2018-SS41**	**2018-AP2-BS1**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Acenaphthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Chrysene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Fluorene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Perylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Phenanthrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5642877	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	83	85	84	93	85		5642877	
D14-Terphenyl (FS)	%	90	96	96	102	95		5642877	
D8-Acenaphthylene	%	94	94	87	90	95		5642877	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK234				HGK234			
Sampling Date		2018/07/13				2018/07/13			
COC Number		D33417				D33417			
	UNITS	**2018-BH07-GP05**	**RDL**	**QC Batch**	**MDL**	**2018-BH07-GP05 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5652419	N/A	<0.025	0.025	5652419	N/A
Toluene	mg/kg	<0.025	0.025	5652419	N/A	<0.025	0.025	5652419	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5652419	0.025	<0.025	0.025	5652419	0.025
Total Xylenes	mg/kg	<0.050	0.050	5652419	N/A	<0.050	0.050	5652419	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5652419	N/A	<2.5	2.5	5652419	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5644252	N/A				
>C16-C21 Hydrocarbons	mg/kg	<10	10	5644252	N/A				
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5644252	N/A				
Modified TPH (Tier1)	mg/kg	<15	15	5636755	N/A				
Reached Baseline at C32	mg/kg	NA	N/A	5644252	N/A				
Hydrocarbon Resemblance	mg/kg	NA	N/A	5644252	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	87		5644252					
n-Dotriacontane - Extractable	%	97		5644252					
Isobutylbenzene - Volatile	%	100		5652419		96		5652419	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK235	HGK236				HGK236			
Sampling Date		2018/07/13	2018/07/13				2018/07/13			
COC Number		D33417	D33417				D33417			
	UNITS	**2018-BH25-GP01**	**2018-BH25-GP07**	**RDL**	**QC Batch**	**MDL**	**2018-BH25-GP07 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	0.025	5641381	N/A				
Toluene	mg/kg	<0.025	<0.025	0.025	5641381	N/A				
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5641381	0.025				
Total Xylenes	mg/kg	<0.050	0.24	0.050	5641381	N/A				
C6 - C10 (less BTEX)	mg/kg	<2.5	230	2.5	5641381	N/A				
>C10-C16 Hydrocarbons	mg/kg	<10	1100	10	5642880	N/A	1300	10	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	61	10	5642880	N/A	71	10	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	15	5642880	N/A	<15	15	5642880	N/A
Modified TPH (Tier1)	mg/kg	<15	1400	15	5638080	N/A				
Reached Baseline at C32	mg/kg	NA	Yes	N/A	5642880	N/A				
Hydrocarbon Resemblance	mg/kg	NA	COMMENT (1)	N/A	5642880	N/A				
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	93	119		5642880		118		5642880	
n-Dotriacontane - Extractable	%	89	88		5642880		80		5642880	
Isobutylbenzene - Volatile	%	113 (2)	80		5641381					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK237	HGK238	HGK239		HGK240			
Sampling Date		2018/07/13	2018/07/13	2018/07/13		2018/07/13			
COC Number		D33417	D33417	D33417		D33417			
	UNITS	**2018-BH67-GP07**	**2018-BH24-GP01**	**2018-BH24-GP07**	**QC Batch**	**2018-BH23-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	<0.025	5641381	<0.025	0.025	5652419	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	5641381	<0.025	0.025	5652419	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	5641381	<0.025	0.025	5652419	0.025
Total Xylenes	mg/kg	0.21	<0.050	<0.050	5641381	<0.050	0.050	5652419	N/A
C6 - C10 (less BTEX)	mg/kg	180	16	<2.5	5641381	<2.5	2.5	5652419	N/A
>C10-C16 Hydrocarbons	mg/kg	820	13	<10	5642880	<10	10	5644252	N/A
>C16-C21 Hydrocarbons	mg/kg	49	<10	<10	5642880	<10	10	5644252	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	5642880	<15	15	5644252	N/A
Modified TPH (Tier1)	mg/kg	1100	29	<15	5638080	<15	15	5636755	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	NA	5642880	NA	N/A	5644252	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (1)	NA	5642880	NA	N/A	5644252	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	108	92	101	5642880	88		5644252	
n-Dotriacontane - Extractable	%	91	85	110	5642880	95		5644252	
Isobutylbenzene - Volatile	%					100		5652419	
Isobutylbenzene - Volatile	%	81 (2)	104	102	5641381				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK241	HGK242	HGK287		HGK288			
Sampling Date		2018/07/13	2018/07/13	2018/07/13		2018/07/13			
COC Number		D33417	D33417	D33418		D33418			
	UNITS	**2018-BH22-GP01**	**2018-BH22-GP07**	**2018-MW20-GP02**	**RDL**	**2018-MW20-GP08**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	<0.025	0.025	<0.025	0.025	5641381	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	0.025	<0.20 (1)	0.20	5641381	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	0.025	0.26	0.025	5641381	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	0.050	13	0.050	5641381	N/A
C6 - C10 (less BTEX)	mg/kg	33	<2.5	180	2.5	1200 (2)	25	5641381	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	19	10	5500	50	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	10	360	50	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	15	<75	75	5642880	N/A
Modified TPH (Tier1)	mg/kg	33	<15	200	15	7100	75	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	NA	Yes	N/A	Yes	N/A	5642880	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (3)	NA	COMMENT (3)	N/A	COMMENT (4)	N/A	5642880	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	101	106	106		118		5642880	
n-Dotriacontane - Extractable	%	111 (5)	123	120		123 (6)		5642880	
Isobutylbenzene - Volatile	%	96	98	99 (7)		91		5641381	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to matrix interference.
(2) Elevated VPH RDL(s) due to sample dilution.
(3) One product in the gasoline range.
(4) One product in the gasoline range. Fuel oil fraction.
(5) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(6) Elevated TEH RDL(s) due to sample dilution.
(7) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK289	HGK290	HGK291	HGK292			
Sampling Date		2018/07/13	2018/07/13	2018/07/13	2018/07/13			
COC Number		D33418	D33418	D33418	D33418			
	UNITS	**2018-MW26-GP08**	**2018-SS30**	**2018-SS31**	**2018-SS32**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5641381	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5641381	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5641381	0.025
Total Xylenes	mg/kg	0.14	<0.050	<0.050	<0.050	0.050	5641381	N/A
C6 - C10 (less BTEX)	mg/kg	77	<2.5	<2.5	<2.5	2.5	5641381	N/A
>C10-C16 Hydrocarbons	mg/kg	3100	<10	<10	30	10	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg	430	<10	<10	360	10	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg	53	140	120	4500	15	5642880	N/A
Modified TPH (Tier1)	mg/kg	3700	140	120	4900	15	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	Yes	No	N/A	5642880	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (2)	COMMENT (2)	COMMENT (2)	N/A	5642880	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	111	108	107	102		5642880	
n-Dotriacontane - Extractable	%	95	123 (3)	121 (3)	38 (4)		5642880	
Isobutylbenzene - Volatile	%	91	103 (5)	101	92		5641381	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) Lube oil fraction.
(3) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(4) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request. TEH surrogate(s) not within acceptance limits due to product interference.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK293	HGK294			HGK295			
Sampling Date		2018/07/13	2018/07/13			2018/07/13			
COC Number		D33418	D33418			D33418			
	UNITS	**2018-SS33**	**2018-SS34**	**RDL**	**QC Batch**	**2018-SS35**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	0.025	5641381	<0.025	0.025	5641386	N/A
Toluene	mg/kg	<0.025	<0.025	0.025	5641381	<0.025	0.025	5641386	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5641381	<0.025	0.025	5641386	0.025
Total Xylenes	mg/kg	<0.050	<0.050	0.050	5641381	<0.050	0.050	5641386	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	2.5	5641381	<2.5	2.5	5641386	N/A
>C10-C16 Hydrocarbons	mg/kg	13	37	10	5642880	350	100	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg	160	86	10	5642880	1600	100	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg	310	62	15	5642880	16000	150	5642880	N/A
Modified TPH (Tier1)	mg/kg	480	190	15	5638080	18000	150	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	N/A	5642880	No	N/A	5642880	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (2)	N/A	5642880	COMMENT (3)	N/A	5642880	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	96	104		5642880	106		5642880	
n-Dotriacontane - Extractable	%	110 (4)	128 (5)		5642880	27 (6)		5642880	
Isobutylbenzene - Volatile	%	113	109		5641381	95		5641386	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel / lube range.
(2) One product in fuel oil range. Possible lube oil fraction.
(3) Lube oil fraction.
(4) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(5) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(6) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request. Elevated TEH RDL(s) due to sample dilution. TEH surrogate(s) not within acceptance limits due to sample dilution / product interference.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK295				HGK296			
Sampling Date		2018/07/13				2018/07/13			
COC Number		D33418				D33418			
	UNITS	**2018-SS35 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SS36**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5641386	N/A	<0.025	0.025	5641386	0.010
Toluene	mg/kg	<0.025	0.025	5641386	N/A	<0.025	0.025	5641386	0.010
Ethylbenzene	mg/kg	<0.025	0.025	5641386	0.025	<0.025	0.025	5641386	0.025
Total Xylenes	mg/kg	<0.050	0.050	5641386	N/A	<0.050	0.050	5641386	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5641386	N/A	<2.5	2.5	5641386	N/A
>C10-C16 Hydrocarbons	mg/kg					82	10	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg					93	10	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg					730	15	5642880	N/A
Modified TPH (Tier1)	mg/kg					900	15	5638080	N/A
Reached Baseline at C32	mg/kg					Yes	N/A	5642880	N/A
Hydrocarbon Resemblance	mg/kg					COMMENT (1)	N/A	5642880	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%					101		5642880	
n-Dotriacontane - Extractable	%					110 (2)		5642880	
Isobutylbenzene - Volatile	%	93		5641386		104		5641386	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) One product in fuel oil range. Lube oil fraction.
(2) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK356				HGK357		HGK358			
Sampling Date		2018/07/13				2018/07/13		2018/07/13			
COC Number		D33419				D33419		D33419			
	UNITS	**2018-SS37**	**RDL**	**QC Batch**	**MDL**	**2018-SS38**	**QC Batch**	**2018-SS39**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons											
Benzene	mg/kg	<0.025	0.025	5654238	0.010	<0.025	5641386	<0.025	0.025	5641386	0.010
Toluene	mg/kg	<0.025	0.025	5654238	0.010	<0.025	5641386	<0.025	0.025	5641386	0.010
Ethylbenzene	mg/kg	<0.025	0.025	5654238	0.010	<0.025	5641386	<0.025	0.025	5641386	0.025
Total Xylenes	mg/kg	<0.050	0.050	5654238	0.010	<0.050	5641386	<0.050	0.050	5641386	N/A
Aliphatic >C6-C8	mg/kg	<1.0	1.0	5654238	0.020						
Aliphatic >C8-C10	mg/kg	<1.0	1.0	5654238	0.080						
C6 - C10 (less BTEX)	mg/kg					<2.5	5641386	<2.5	2.5	5641386	N/A
>C10-C16 Hydrocarbons	mg/kg					<10	5642880	<10	10	5642890	N/A
>C8-C10 Aromatics (-EX)	mg/kg	<0.50	0.50	5654238	0.020						
>C16-C21 Hydrocarbons	mg/kg					<10	5642880	<10	10	5642890	N/A
Aliphatic >C10-C12	mg/kg	<40 (1)	40	5642826	1.6						
Aliphatic >C12-C16	mg/kg	130 (1)	75	5642826	3.0						
>C21-<C32 Hydrocarbons	mg/kg					47	5642880	<15	15	5642890	N/A
Aliphatic >C16-C21	mg/kg	930 (1)	75	5642826	3.0						
Aliphatic >C21-<C32	mg/kg	12000 (1)	75	5642826	3.0						
Modified TPH (Tier1)	mg/kg					47	5638080	<15	15	5638080	N/A
Aromatic >C10-C12	mg/kg	40	4.0	5642826	0.80						
Reached Baseline at C32	mg/kg	No	N/A	5642826	N/A	Yes	5642880	NA	N/A	5642890	N/A
Aromatic >C12-C16	mg/kg	110	15	5642826	3.0						
Hydrocarbon Resemblance	mg/kg	COMMENT (2)	N/A	5642826	N/A	COMMENT (3)	5642880	NA	N/A	5642890	N/A
Aromatic >C16-C21	mg/kg	320	15	5642826	3.0						
Aromatic >C21-<C32	mg/kg	3300	15	5642826	3.0						
Modified TPH (Tier 2)	mg/kg	17000	75	5638082	3.0						
Surrogate Recovery (%)											
Isobutylbenzene - Extractable	%	107		5642826							
n-Dotriacontane - Extractable	%	94		5642826							
Isobutylbenzene - Extractable	%					105	5642880	77		5642890	
n-Dotriacontane - Extractable	%					117 (4)	5642880	85 (4)		5642890	
Isobutylbenzene - Volatile	%	74 (5)		5654238							

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated TEH RDL(s) due to sample dilution.
(2) Lube oil fraction.
(3) Unidentified compound(s) in lube oil range.
(4) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK356				HGK357		HGK358			
Sampling Date		2018/07/13				2018/07/13		2018/07/13			
COC Number		D33419				D33419		D33419			
	UNITS	**2018-SS37**	**RDL**	**QC Batch**	**MDL**	**2018-SS38**	**QC Batch**	**2018-SS39**	**RDL**	**QC Batch**	**MDL**
Isobutylbenzene - Volatile	%					110	5641386	106		5641386	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK359				HGK359			
Sampling Date		2018/07/13				2018/07/13			
COC Number		D33419				D33419			
	UNITS	**2018-SS40**	**RDL**	**QC Batch**	**MDL**	**2018-SS40 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5641386	0.010				
Toluene	mg/kg	<0.025	0.025	5641386	0.010				
Ethylbenzene	mg/kg	<0.025	0.025	5641386	0.025				
Total Xylenes	mg/kg	<0.050	0.050	5641386	N/A				
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5641386	N/A				
>C10-C16 Hydrocarbons	mg/kg	<10	10	5642890	N/A	<10	10	5642890	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5642890	N/A	<10	10	5642890	N/A
>C21-<C32 Hydrocarbons	mg/kg	46	15	5642890	N/A	48	15	5642890	N/A
Modified TPH (Tier1)	mg/kg	46	15	5638080	N/A				
Reached Baseline at C32	mg/kg	Yes	N/A	5642890	N/A				
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	N/A	5642890	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	109		5642890		100		5642890	
n-Dotriacontane - Extractable	%	115 (2)		5642890		111 (2)		5642890	
Isobutylbenzene - Volatile	%	122 (3)		5641386					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range.
(2) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK360	HGK361	HGK362		HGK363			
Sampling Date		2018/07/13	2018/07/13	2018/07/13		2018/07/13			
COC Number		D33419	D33419	D33419		D33419			
	UNITS	**2018-SS41**	**2018-SS42**	**2018-SS43**	**QC Batch**	**2018-SS44**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	<0.025	5641386	<0.025	0.025	5642266	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	5641386	<0.025	0.025	5642266	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	5641386	<0.025	0.025	5642266	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	5641386	<0.050	0.050	5642266	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	5641386	<2.5	2.5	5642266	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	5642890	<10	10	5642890	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	5642890	<10	10	5642890	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	300	<15	5642890	52	15	5642890	N/A
Modified TPH (Tier1)	mg/kg	<15	300	<15	5638080	52	15	5638080	N/A
Reached Baseline at C32	mg/kg	NA	Yes	NA	5642890	Yes	N/A	5642890	N/A
Hydrocarbon Resemblance	mg/kg	NA	COMMENT (1)	NA	5642890	COMMENT (2)	N/A	5642890	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	100	104	105	5642890	104		5642890	
n-Dotriacontane - Extractable	%	109 (3)	114 (4)	116 (3)	5642890	109 (4)		5642890	
Isobutylbenzene - Volatile	%	103	113	137 (5)	5641386	106		5642266	

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

N/A = Not Applicable

(1) Lube oil fraction.

(2) Unidentified compound(s) in lube oil range. Possible lube oil fraction.

(3) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

(4) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK364	HGK365		HGK396		HGK397			
Sampling Date		2018/07/13	2018/07/13		2018/07/13		2018/07/13			
COC Number		D33419	D33419		D33420		D33420			
	UNITS	**2018-SS45**	**2018-SS46**	**QC Batch**	**2018-SS47**	**QC Batch**	**2018-SS48**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	5642266	<0.025	5652419	<0.025	0.025	5642266	N/A
Toluene	mg/kg	<0.025	<0.025	5642266	<0.025	5652419	<0.025	0.025	5642266	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	5642266	<0.025	5652419	<0.025	0.025	5642266	0.025
Total Xylenes	mg/kg	<0.050	<0.050	5642266	<0.050	5652419	<0.050	0.050	5642266	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	5642266	<2.5	5652419	<2.5	2.5	5642266	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	5642890	<10	5644252	<10	10	5642890	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	5642890	12	5644252	<10	10	5642890	N/A
>C21-<C32 Hydrocarbons	mg/kg	54	<15	5642890	170	5644252	<15	15	5642890	N/A
Modified TPH (Tier1)	mg/kg	54	<15	5638080	190	5636755	<15	15	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	NA	5642890	Yes	5644252	NA	N/A	5642890	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	NA	5642890	COMMENT (2)	5644252	NA	N/A	5642890	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	105	102	5642890	103	5644252	102		5642890	
n-Dotriacontane - Extractable	%	111 (3)	110 (3)	5642890	128 (3)	5644252	113 (4)		5642890	
Isobutylbenzene - Volatile	%				105	5652419				
Isobutylbenzene - Volatile	%	104	104	5642266			104		5642266	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range. Possible lube oil fraction.
(2) Lube oil fraction.
(3) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(4) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

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Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK399			HGK400			
Sampling Date		2018/07/13			2018/07/13			
COC Number		D33420			D33420			
	UNITS	**2018-AP1-BS2**	**RDL**	**QC Batch**	**2018-AP2-BS1**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	0.025	5652419	<0.050	0.050	5642266	N/A
Toluene	mg/kg	<0.025	0.025	5652419	<0.050	0.050	5642266	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5652419	<0.050	0.050	5642266	0.025
Total Xylenes	mg/kg	<0.050	0.050	5652419	<0.10	0.10	5642266	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5652419	<5.0	5.0	5642266	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5644252	<10	10	5642880	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5644252	<10	10	5642880	N/A
>C21-<C32 Hydrocarbons	mg/kg	20	15	5644252	17	15	5642880	N/A
Modified TPH (Tier1)	mg/kg	20	15	5636755	17	15	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	N/A	5644252	Yes	N/A	5642880	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	N/A	5644252	COMMENT (2)	N/A	5642880	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	87		5644252	107		5642880	
n-Dotriacontane - Extractable	%	97		5644252	127 (3)		5642880	
Isobutylbenzene - Volatile	%	95 (4)		5652419				
Isobutylbenzene - Volatile	%				104 (5)		5642266	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Possible lube oil fraction.
(2) Unidentified compound(s) in lube oil range.
(3) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(5) Elevated VPH RDL(s) due to limited sample.

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HGK358			
Sampling Date		2018/07/13			
COC Number		D33419			
	UNITS	**2018-SS39**	**RDL**	**QC Batch**	**MDL**
PCBs					
Aroclor 1016	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1221	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1232	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1248	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1242	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1254	ug/g	<0.050	0.050	5642779	N/A
Aroclor 1260	ug/g	<0.050	0.050	5642779	N/A
Calculated Total PCB	ug/g	<0.050	0.050	5638073	N/A
Surrogate Recovery (%)					
Decachlorobiphenyl	%	86		5642779	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK233
Sample ID: 2018-BH07-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale

Maxxam ID: HGK233 Dup
Sample ID: 2018-BH07-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale

Maxxam ID: HGK234
Sample ID: 2018-BH07-GP05
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644252	2018/07/24	2018/07/25	Michelle Shearer
Moisture	BAL	5638054	N/A	2018/07/20	Shane Miller
VPH in Soil (PIRI)	PTGC/MS	5652419	2018/07/19	2018/07/29	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/30	Automated Statchk

Maxxam ID: HGK234 Dup
Sample ID: 2018-BH07-GP05
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI)	PTGC/MS	5652419	2018/07/27	2018/07/29	Jacob Henley

Maxxam ID: HGK235
Sample ID: 2018-BH25-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK235 Dup
Sample ID: 2018-BH25-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

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TEST SUMMARY

Maxxam ID: HGK236
Sample ID: 2018-BH25-GP07
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK236 Dup
Sample ID: 2018-BH25-GP07
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum

Maxxam ID: HGK237
Sample ID: 2018-BH67-GP07
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK238
Sample ID: 2018-BH24-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK239
Sample ID: 2018-BH24-GP07
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

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TEST SUMMARY

Maxxam ID: HGK240
Sample ID: 2018-BH23-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644252	2018/07/24	2018/07/25	Michelle Shearer
Moisture	BAL	5638054	N/A	2018/07/20	Shane Miller
VPH in Soil (PIRI)	PTGC/MS	5652419	2018/07/19	2018/07/29	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/30	Automated Statchk

Maxxam ID: HGK241
Sample ID: 2018-BH22-GP01
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK242
Sample ID: 2018-BH22-GP07
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK287
Sample ID: 2018-MW20-GP02
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK288
Sample ID: 2018-MW20-GP08
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/24	Jacob Henley

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TEST SUMMARY

Maxxam ID: HGK289
Sample ID: 2018-MW26-GP08
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK290
Sample ID: 2018-SS30
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK291
Sample ID: 2018-SS31
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK292
Sample ID: 2018-SS32
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK293
Sample ID: 2018-SS33
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5643978	2018/07/24	2018/07/24	Cassandra Hartery
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK294
Sample ID: 2018-SS34
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641381	N/A	2018/07/22	Jacob Henley

Maxxam ID: HGK295
Sample ID: 2018-SS35
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK295 Dup
Sample ID: 2018-SS35
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK296
Sample ID: 2018-SS36
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK356
Sample ID: 2018-SS37
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (AA PIRI)	GC/FID	5642826	2018/07/23	2018/07/27	Bria Harvey
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T2) Calc. for Soil	CALC	5638082	N/A	2018/08/01	Automated Statchk
VPH in Soil (PIRI2) - Field Preserved	PTGC/MS	5654238	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HGK357
Sample ID: 2018-SS38
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK357 Dup
Sample ID: 2018-SS38
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour

Maxxam ID: HGK358
Sample ID: 2018-SS39
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5642779	2018/07/23	2018/07/24	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/24	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK359
Sample ID: 2018-SS40
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK359 Dup
Sample ID: 2018-SS40
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer

Maxxam ID: HGK360
Sample ID: 2018-SS41
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK361
Sample ID: 2018-SS42
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK362
Sample ID: 2018-SS43
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK362 **Collected:** 2018/07/13
Sample ID: 2018-SS43 **Shipped:**
Matrix: Soil **Received:** 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5641386	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGK363 **Collected:** 2018/07/13
Sample ID: 2018-SS44 **Shipped:**
Matrix: Soil **Received:** 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK364 **Collected:** 2018/07/13
Sample ID: 2018-SS45 **Shipped:**
Matrix: Soil **Received:** 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK365 **Collected:** 2018/07/13
Sample ID: 2018-SS46 **Shipped:**
Matrix: Soil **Received:** 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK396 **Collected:** 2018/07/13
Sample ID: 2018-SS47 **Shipped:**
Matrix: Soil **Received:** 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644252	2018/07/24	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5638976	2018/07/20	2018/07/20	Bryon Angevine
Moisture	BAL	5638054	N/A	2018/07/20	Shane Miller
VPH in Soil (PIRI)	PTGC/MS	5652419	2018/07/19	2018/07/29	Jacob Henley

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK396
Sample ID: 2018-SS47
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/30	Automated Statchk

Maxxam ID: HGK397
Sample ID: 2018-SS48
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK398
Sample ID: 2018-AP1-BS1
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery

Maxxam ID: HGK399
Sample ID: 2018-AP1-BS2
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644252	2018/07/24	2018/07/25	Michelle Shearer
Moisture	BAL	5638054	N/A	2018/07/20	Shane Miller
VPH in Soil (PIRI)	PTGC/MS	5652419	2018/07/19	2018/07/29	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/30	Automated Statchk

Maxxam ID: HGK400
Sample ID: 2018-AP2-BS1
Matrix: Soil

Collected: 2018/07/13
Shipped:
Received: 2018/07/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5642880	2018/07/23	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

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Report Date: 2018/08/01

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	8.9°C

Lab preservation performed on the following samples. Analytical results for VPH parameters should be regarded as minimum
2018-BH07-GP05
2018-BH23-GP01
2018-47
2018-AP1-BS2

Results relate only to the items tested.

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5641381	Isobutylbenzene - Volatile	2018/07/21	98 (1)	60 - 130	92	60 - 130	93	%		
5641386	Isobutylbenzene - Volatile	2018/07/21	90	60 - 130	94	60 - 130	95	%		
5642266	Isobutylbenzene - Volatile	2018/07/23	117	60 - 130	94	60 - 130	96	%		
5642779	Decachlorobiphenyl	2018/07/24	97	70 - 130	96	70 - 130	97	%		
5642826	Isobutylbenzene - Extractable	2018/07/27					94	%		
5642826	n-Dotriacontane - Extractable	2018/07/27					98	%		
5642877	D10-Anthracene	2018/07/24	90	50 - 130	96	50 - 130	95	%		
5642877	D14-Terphenyl (FS)	2018/07/24	88	50 - 130	94	50 - 130	95	%		
5642877	D8-Acenaphthylene	2018/07/24	96	50 - 130	98	50 - 130	100	%		
5642880	Isobutylbenzene - Extractable	2018/07/24	113	60 - 130	94	60 - 130	91	%		
5642880	n-Dotriacontane - Extractable	2018/07/24	80	60 - 130	86	60 - 130	97	%		
5642890	Isobutylbenzene - Extractable	2018/07/23	103	60 - 130	100	60 - 130	99	%		
5642890	n-Dotriacontane - Extractable	2018/07/23	118	60 - 130	94	60 - 130	87	%		
5644252	Isobutylbenzene - Extractable	2018/07/25	90	60 - 130	89	60 - 130	89	%		
5644252	n-Dotriacontane - Extractable	2018/07/25	100	60 - 130	107	60 - 130	103	%		
5652419	Isobutylbenzene - Volatile	2018/07/29	85	60 - 130	96	60 - 130	95	%		
5654238	Isobutylbenzene - Volatile	2018/07/30			83	60 - 130	80	%		
5638054	Moisture	2018/07/20							7.5	25
5638976	Acid Extractable Aluminum (Al)	2018/07/20					<10	mg/kg	1.1	35
5638976	Acid Extractable Antimony (Sb)	2018/07/20	102	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Arsenic (As)	2018/07/20	101	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Barium (Ba)	2018/07/20	104	75 - 125	99	75 - 125	<5.0	mg/kg	15	35
5638976	Acid Extractable Beryllium (Be)	2018/07/20	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Bismuth (Bi)	2018/07/20	101	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Boron (B)	2018/07/20	100	75 - 125	107	75 - 125	<50	mg/kg	NC	35
5638976	Acid Extractable Cadmium (Cd)	2018/07/20	100	75 - 125	102	75 - 125	<0.30	mg/kg	NC	35
5638976	Acid Extractable Chromium (Cr)	2018/07/20	96	75 - 125	100	75 - 125	<2.0	mg/kg	7.8	35
5638976	Acid Extractable Cobalt (Co)	2018/07/20	103	75 - 125	102	75 - 125	<1.0	mg/kg	4.7	35
5638976	Acid Extractable Copper (Cu)	2018/07/20	103	75 - 125	99	75 - 125	<2.0	mg/kg	23	35
5638976	Acid Extractable Iron (Fe)	2018/07/20					<50	mg/kg	8.5	35
5638976	Acid Extractable Lead (Pb)	2018/07/20	98	75 - 125	99	75 - 125	<0.50	mg/kg	9.1	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5638976	Acid Extractable Lithium (Li)	2018/07/20	105	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Manganese (Mn)	2018/07/20	NC	75 - 125	101	75 - 125	<2.0	mg/kg	5.7	35
5638976	Acid Extractable Mercury (Hg)	2018/07/20	94	75 - 125	109	75 - 125	<0.10	mg/kg	NC	35
5638976	Acid Extractable Molybdenum (Mo)	2018/07/20	101	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Nickel (Ni)	2018/07/20	102	75 - 125	102	75 - 125	<2.0	mg/kg	4.9	35
5638976	Acid Extractable Rubidium (Rb)	2018/07/20	99	75 - 125	99	75 - 125	<2.0	mg/kg	0.24	35
5638976	Acid Extractable Selenium (Se)	2018/07/20	102	75 - 125	104	75 - 125	<1.0	mg/kg	NC	35
5638976	Acid Extractable Silver (Ag)	2018/07/20	103	75 - 125	99	75 - 125	<0.50	mg/kg	NC	35
5638976	Acid Extractable Strontium (Sr)	2018/07/20	103	75 - 125	98	75 - 125	<5.0	mg/kg	18	35
5638976	Acid Extractable Thallium (Tl)	2018/07/20	98	75 - 125	102	75 - 125	<0.10	mg/kg	NC	35
5638976	Acid Extractable Tin (Sn)	2018/07/20	92	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5638976	Acid Extractable Uranium (U)	2018/07/20	101	75 - 125	103	75 - 125	<0.10	mg/kg	27	35
5638976	Acid Extractable Vanadium (V)	2018/07/20	91	75 - 125	101	75 - 125	<2.0	mg/kg	16	35
5638976	Acid Extractable Zinc (Zn)	2018/07/20	103	75 - 125	107	75 - 125	<5.0	mg/kg	7.7	35
5641381	Benzene	2018/07/22	79	60 - 130	96	60 - 140	<0.025	mg/kg	NC	50
5641381	C6 - C10 (less BTEX)	2018/07/22					<2.5	mg/kg	NC	50
5641381	Ethylbenzene	2018/07/22	93	60 - 130	97	60 - 140	<0.025	mg/kg	NC	50
5641381	Toluene	2018/07/22	84	60 - 130	96	60 - 140	<0.025	mg/kg	NC	50
5641381	Total Xylenes	2018/07/22	91	60 - 130	96	60 - 140	<0.050	mg/kg	NC	50
5641386	Benzene	2018/07/21	76	60 - 130	97	60 - 140	<0.025	mg/kg	NC	50
5641386	C6 - C10 (less BTEX)	2018/07/21					<2.5	mg/kg	NC	50
5641386	Ethylbenzene	2018/07/21	91	60 - 130	98	60 - 140	<0.025	mg/kg	NC	50
5641386	Toluene	2018/07/21	82	60 - 130	97	60 - 140	<0.025	mg/kg	NC	50
5641386	Total Xylenes	2018/07/21	88	60 - 130	98	60 - 140	<0.050	mg/kg	NC	50
5642233	Moisture	2018/07/23							8.6	25
5642266	Benzene	2018/07/23	90	60 - 130	94	60 - 140	<0.025	mg/kg	NC	50
5642266	C6 - C10 (less BTEX)	2018/07/23					<2.5	mg/kg	NC	50
5642266	Ethylbenzene	2018/07/23	92	60 - 130	96	60 - 140	<0.025	mg/kg	NC	50
5642266	Toluene	2018/07/23	86	60 - 130	95	60 - 140	<0.025	mg/kg	NC	50
5642266	Total Xylenes	2018/07/23	89	60 - 130	93	60 - 140	<0.050	mg/kg	NC	50
5642641	Moisture	2018/07/23							6.3	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642779	Aroclor 1016	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1221	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1232	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1242	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1248	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1254	2018/07/24	109	70 - 130	110	70 - 130	<0.050	ug/g	NC	50
5642779	Aroclor 1260	2018/07/24					<0.050	ug/g	NC	50
5642826	Aliphatic >C10-C12	2018/07/27			73	60 - 130	<8.0	mg/kg	2.7 (2)	50
5642826	Aliphatic >C12-C16	2018/07/27			96	60 - 130	<15	mg/kg	2.6 (2)	50
5642826	Aliphatic >C16-C21	2018/07/27			100	60 - 130	<15	mg/kg	8.1 (2)	50
5642826	Aliphatic >C21-<C32	2018/07/27			103	60 - 130	<15	mg/kg	12 (2)	50
5642826	Aromatic >C10-C12	2018/07/27			102	60 - 130	<4.0	mg/kg	20	50
5642826	Aromatic >C12-C16	2018/07/27			93	60 - 130	<15	mg/kg	24	50
5642826	Aromatic >C16-C21	2018/07/27			90	60 - 130	<15	mg/kg	24	50
5642826	Aromatic >C21-<C32	2018/07/27			89	60 - 130	<15	mg/kg	1.6	50
5642877	1-Methylnaphthalene	2018/07/24	87	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5642877	2-Methylnaphthalene	2018/07/24	95	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5642877	Acenaphthene	2018/07/24	96	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642877	Acenaphthylene	2018/07/24	102	50 - 130	105	50 - 130	<0.010	mg/kg	NC	50
5642877	Anthracene	2018/07/24	97	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(a)anthracene	2018/07/24	98	50 - 130	101	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(a)pyrene	2018/07/24	93	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(b)fluoranthene	2018/07/24	91	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(g,h,i)perylene	2018/07/24	103	50 - 130	103	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(j)fluoranthene	2018/07/24	94	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(k)fluoranthene	2018/07/24	92	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5642877	Chrysene	2018/07/24	93	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642877	Dibenz(a,h)anthracene	2018/07/24	91	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5642877	Fluoranthene	2018/07/24	94	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642877	Fluorene	2018/07/24	101	50 - 130	103	50 - 130	<0.010	mg/kg	NC	50
5642877	Indeno(1,2,3-cd)pyrene	2018/07/24	90	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642877	Naphthalene	2018/07/24	91	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642877	Perylene	2018/07/24	94	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642877	Phenanthrene	2018/07/24	91	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5642877	Pyrene	2018/07/24	98	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5642880	>C10-C16 Hydrocarbons	2018/07/24	NC	30 - 130	108	60 - 130	<10	mg/kg	18	50
5642880	>C16-C21 Hydrocarbons	2018/07/24	90	30 - 130	100	60 - 130	<10	mg/kg	16	50
5642880	>C21-<C32 Hydrocarbons	2018/07/24	111	30 - 130	124	60 - 130	<15	mg/kg	NC	50
5642890	>C10-C16 Hydrocarbons	2018/07/24	99	30 - 130	93	60 - 130	<10	mg/kg	NC	50
5642890	>C16-C21 Hydrocarbons	2018/07/24	94	30 - 130	87	60 - 130	<10	mg/kg	NC	50
5642890	>C21-<C32 Hydrocarbons	2018/07/24	110	30 - 130	109	60 - 130	<15	mg/kg	5.7	50
5643978	Acid Extractable Aluminum (Al)	2018/07/24					<10	mg/kg	27	35
5643978	Acid Extractable Antimony (Sb)	2018/07/24	103	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Arsenic (As)	2018/07/24	99	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Barium (Ba)	2018/07/24	106	75 - 125	92	75 - 125	<5.0	mg/kg	22	35
5643978	Acid Extractable Beryllium (Be)	2018/07/24	101	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Bismuth (Bi)	2018/07/24	101	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Boron (B)	2018/07/24	102	75 - 125	80	75 - 125	<50	mg/kg	NC	35
5643978	Acid Extractable Cadmium (Cd)	2018/07/24	98	75 - 125	99	75 - 125	<0.30	mg/kg	NC	35
5643978	Acid Extractable Chromium (Cr)	2018/07/24	99	75 - 125	96	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Cobalt (Co)	2018/07/24	96	75 - 125	96	75 - 125	<1.0	mg/kg	NC	35
5643978	Acid Extractable Copper (Cu)	2018/07/24	101	75 - 125	97	75 - 125	<2.0	mg/kg	24	35
5643978	Acid Extractable Iron (Fe)	2018/07/24					<50	mg/kg	33	35
5643978	Acid Extractable Lead (Pb)	2018/07/24	99	75 - 125	98	75 - 125	<0.50	mg/kg	23	35
5643978	Acid Extractable Lithium (Li)	2018/07/24	106	75 - 125	102	75 - 125	<2.0	mg/kg	3.6	35
5643978	Acid Extractable Manganese (Mn)	2018/07/24	NC	75 - 125	99	75 - 125	<2.0	mg/kg	25	35
5643978	Acid Extractable Mercury (Hg)	2018/07/24	94	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35
5643978	Acid Extractable Molybdenum (Mo)	2018/07/24	99	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Nickel (Ni)	2018/07/24	101	75 - 125	98	75 - 125	<2.0	mg/kg	33	35
5643978	Acid Extractable Rubidium (Rb)	2018/07/24	98	75 - 125	99	75 - 125	<2.0	mg/kg	24	35
5643978	Acid Extractable Selenium (Se)	2018/07/24	100	75 - 125	100	75 - 125	<1.0	mg/kg	NC	35
5643978	Acid Extractable Silver (Ag)	2018/07/24	98	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5643978	Acid Extractable Strontium (Sr)	2018/07/24	104	75 - 125	98	75 - 125	<5.0	mg/kg	23	35
5643978	Acid Extractable Thallium (Tl)	2018/07/24	100	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35
5643978	Acid Extractable Tin (Sn)	2018/07/24	109	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Uranium (U)	2018/07/24	99	75 - 125	99	75 - 125	<0.10	mg/kg	13	35
5643978	Acid Extractable Vanadium (V)	2018/07/24	105	75 - 125	97	75 - 125	<2.0	mg/kg	47 (3)	35
5643978	Acid Extractable Zinc (Zn)	2018/07/24	107	75 - 125	99	75 - 125	<5.0	mg/kg	15	35
5644055	Acid Extractable Aluminum (Al)	2018/07/25					<10	mg/kg	22	35
5644055	Acid Extractable Antimony (Sb)	2018/07/25	100	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Arsenic (As)	2018/07/25	102	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Barium (Ba)	2018/07/25	90	75 - 125	101	75 - 125	<5.0	mg/kg	16	35
5644055	Acid Extractable Beryllium (Be)	2018/07/25	108	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Bismuth (Bi)	2018/07/25	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Boron (B)	2018/07/25	110	75 - 125	124	75 - 125	<50	mg/kg	NC	35
5644055	Acid Extractable Cadmium (Cd)	2018/07/25	101	75 - 125	102	75 - 125	<0.30	mg/kg	NC	35
5644055	Acid Extractable Chromium (Cr)	2018/07/25	98	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Cobalt (Co)	2018/07/25	101	75 - 125	105	75 - 125	<1.0	mg/kg	13	35
5644055	Acid Extractable Copper (Cu)	2018/07/25	101	75 - 125	104	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Iron (Fe)	2018/07/25					<50	mg/kg	15	35
5644055	Acid Extractable Lead (Pb)	2018/07/25	98	75 - 125	102	75 - 125	<0.50	mg/kg	12	35
5644055	Acid Extractable Lithium (Li)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	8.6	35
5644055	Acid Extractable Manganese (Mn)	2018/07/25	NC	75 - 125	105	75 - 125	<2.0	mg/kg	12	35
5644055	Acid Extractable Mercury (Hg)	2018/07/25	97	75 - 125	105	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Molybdenum (Mo)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Nickel (Ni)	2018/07/25	103	75 - 125	107	75 - 125	<2.0	mg/kg	22	35
5644055	Acid Extractable Rubidium (Rb)	2018/07/25	98	75 - 125	101	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Selenium (Se)	2018/07/25	104	75 - 125	107	75 - 125	<1.0	mg/kg	NC	35
5644055	Acid Extractable Silver (Ag)	2018/07/25	101	75 - 125	104	75 - 125	<0.50	mg/kg	NC	35
5644055	Acid Extractable Strontium (Sr)	2018/07/25	99	75 - 125	101	75 - 125	<5.0	mg/kg	3.7	35
5644055	Acid Extractable Thallium (Tl)	2018/07/25	101	75 - 125	102	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Tin (Sn)	2018/07/25	101	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Uranium (U)	2018/07/25	100	75 - 125	102	75 - 125	<0.10	mg/kg	0.19	35

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5644055	Acid Extractable Vanadium (V)	2018/07/25	97	75 - 125	105	75 - 125	<2.0	mg/kg	27	35
5644055	Acid Extractable Zinc (Zn)	2018/07/25	89	75 - 125	107	75 - 125	<5.0	mg/kg	15	35
5644252	>C10-C16 Hydrocarbons	2018/07/25	88	30 - 130	89	60 - 130	<10	mg/kg	NC	50
5644252	>C16-C21 Hydrocarbons	2018/07/25	90	30 - 130	89	60 - 130	<10	mg/kg	NC	50
5644252	>C21-<C32 Hydrocarbons	2018/07/25	112	30 - 130	117	60 - 130	<15	mg/kg	NC	50
5652419	Benzene	2018/07/29	97	60 - 130	99	60 - 140	<0.025	mg/kg	NC	50
5652419	C6 - C10 (less BTEX)	2018/07/29					<2.5	mg/kg	NC	50
5652419	Ethylbenzene	2018/07/29	101	60 - 130	98	60 - 140	<0.025	mg/kg	NC	50
5652419	Toluene	2018/07/29	90	60 - 130	96	60 - 140	<0.025	mg/kg	NC	50
5652419	Total Xylenes	2018/07/29	97	60 - 130	95	60 - 140	<0.050	mg/kg	NC	50
5654238	>C8-C10 Aromatics (-EX)	2018/07/30					<0.50	mg/kg		
5654238	Aliphatic >C6-C8	2018/07/30					<1.0	mg/kg		
5654238	Aliphatic >C8-C10	2018/07/30					<1.0	mg/kg		
5654238	Benzene	2018/07/30			89	60 - 140	<0.025	mg/kg		
5654238	Ethylbenzene	2018/07/30			88	60 - 140	<0.025	mg/kg		
5654238	Toluene	2018/07/30			86	60 - 140	<0.025	mg/kg		
5654238	Total Xylenes	2018/07/30			86	60 - 140	<0.050	mg/kg		

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

(2) Elevated TEH RDL(s) due to sample dilution.

(3) Poor RPD due to sample inhomogeneity. Results verified by repeat digestion and analysis.

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Maxxam Job #: B8I1520
Report Date: 2018/08/01

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Alan Stewart, Organics Manager, Bedford

Mike MacGillivray, Scientific Specialist (Inorganics)

Phil Deveau, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33417 Page 1 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St John's NL Postal Code: A1B 0A2	Address: Postal Code:	Project #: 121414498	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.6 9.4 7.6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-BH07-GP01	2018/07/13		Soil																	X							
2	2018-BH07-GP05																X											
3	2018-BH25-GP01																X											
4	2018-BH25-GP07																X											
5	2018-BH67-GP07																X											
6	2018-BH24-GP01												X				X											
7	2018-BH24-GP07																X											
8	2018-BH23-GP01																X											
9	2018-BH22-GP01																X											
10	2018-BH22-GP07																X											

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse [illegible]	2018/07/18	10:00	B8I1520

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JUL 18 2018

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CHAIN OF CUSTODY RECORD

COC #: D33418 Page 2 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St John's NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.6 9.4 7.6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW20-GP02	2018/07/13		Soil													X											
2	2018-MW20-GP08	↓		↓													X											
3	2018-MW26-GP08																X											
4	2018-SS30																X				X							TSG (TripleSilicaGel)
5	2018-SS31												X				X											TSG
6	2018-SS32																X				X							TSG
7	2018-SS33												X				X											TSG
8	2018-SS34																X				X							TSG
9	2018-SS35																X											TSG
10	2018-SS36	↓		↓													X											TSG

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse DeSplinter	2018/07/18	10:00	B8I1520

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CHAIN OF CUSTODY RECORD

COC #: D33419 Page 3 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analytes
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.6 9.4 7.6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-5537	2018/07/13		soil													X				X							TPH Fractionation TSG
2	2018-5538																X				X							TSG
3	2018-5539																X				X		X					cancel PCB if not enough sample TSG
4	2018-5540																X				X							TSG
5	2018-5541																X				X							TSG
6	2018-5542												X				X											TSG
7	2018-5543												X				X											TSG
8	2018-5544												X				X											TSG
9	2018-5545												X				X											TSG
10	2018-5546												X				X											TSG

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				2018/07/18	10:00	B8I1520

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CHAIN OF CUSTODY RECORD

COC #: D33420 Page 4 of 4

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.6 9.4 7.6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

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1	2018-SS47	2018/07/13		soil									X				X												TSG
2	2018-SS48	↓		↓									X				X												TSG
3	2018-API-BS1												X																
4	2018-API-BS2																X												
5	2018-AP2-BS1	↓		↓													X				X								TSG
6																													
7																													
8																													
9																													
10																													

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Bobbins	2018/07/18	10:00	B8I1520

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JUL 18 2018

SAMPLE	METHANOL LOW	Purple Methanol	One Good One
2018-BH07-GP01	2	1	N
2018-BH07-GP05	1	2	N
2018-BH22-GP07	1	0	Y
2018-BH23-GP01	1	1	N
2018-BH22-GP01	0	1	Y
2018-SS30	1	0	Y
2018-SS45	1	0	Y
2018-47	2	0	N
2018-AP1-BS1	1	0	N
2018-AP1-BS2	2	0	N

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33414, D33415, D33416

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/26
Report #: R5319294
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1522
Received: 2018/07/19, 10:08

Sample Matrix: Soil
Samples Received: 25

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	1	N/A	2018/07/25	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil)	5	N/A	2018/07/26	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	3	2018/07/23	2018/07/24	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	6	2018/07/24	2018/07/24	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	8	2018/07/24	2018/07/25	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	6	2018/07/25	2018/07/25	ATL SOP 00058	EPA 6020A R1 m
Moisture	1	N/A	2018/07/20	ATL SOP 00001	OMOE Handbook 1983 m
Moisture	21	N/A	2018/07/23	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	1	2018/07/23	2018/07/24	ATL SOP 00102	EPA 8270D 2014 m
PAH Compounds by GCMS (SIM) (1)	2	2018/07/23	2018/07/25	ATL SOP 00102	EPA 8270D 2014 m
PAH Compounds by GCMS (SIM) (1)	3	2018/07/24	2018/07/25	ATL SOP 00102	EPA 8270D 2014 m
PCBs in soil by GC/ECD (1)	2	2018/07/24	2018/07/25	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	2	N/A	2018/07/25	N/A	Auto Calc.
VPH in Soil (PIRI) (2)	1	2018/07/19	2018/07/26	ATL SOP 00119	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	3	N/A	2018/07/24	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	13	N/A	2018/07/25	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	1	N/A	2018/07/26	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	16	N/A	2018/07/23	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33414, D33415, D33416

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/26
Report #: R5319294
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1522
Received: 2018/07/19, 10:08

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Sample(s) were not field preserved for VPH when received at the laboratory. Analytical results for VPH parameters should be regarded as minimum values.
(3) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Maxxam
26 Jul 2018 13:51:56

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGK248	HGK249		HGK250			
Sampling Date		2018/07/11	2018/07/12		2018/07/11			
COC Number		D33414	D33414		D33414			
	UNITS	**2018-BH15-GP01**	**2018-MW11-GP08**	**QC Batch**	**2018-BH15-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	7.2	7.7	5642726	11	1.0	5642233	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK251	HGK252	HGK253	HGK254			
Sampling Date		2018/07/11	2018/07/12	2018/07/12	2018/07/12			
COC Number		D33414	D33414	D33414	D33414			
	UNITS	**2018-BH15-GP08**	**2018-MW11-GP08**	**2018-MW62-GP01**	**2018-BH13-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	11	18	13	11	1.0	5642726	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK255	HGK256		HGK257			
Sampling Date		2018/07/12	2018/07/12		2018/07/12			
COC Number		D33414	D33414		D33414			
	UNITS	**2018-BH13-GP07**	**2018-BH13-GP08**	**QC Batch**	**2018-BH63-GP08**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	15	15	5642726	18	1.0	5643223	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK386		HGK388	HGK390	HGK391			
Sampling Date		2018/07/12		2018/07/12	2018/07/12	2018/07/12			
COC Number		D33415		D33415	D33415	D33415			
	UNITS	**2018-BH12-GP01**	**QC Batch**	**2018-BH12-GP08**	**2018-BH10-GP01**	**2018-BH10-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	12	5642641	21	12	13	1.0	5643223	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK392		HGK393	HGK394	HGK395			
Sampling Date		2018/07/12		2018/07/12	2018/07/12	2018/07/12			
COC Number		D33415		D33415	D33415	D33415			
	UNITS	**2018-BH10-GP08**	**QC Batch**	**2018-MW09-GP01**	**2018-MW09-GP02**	**2018-MW66-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	20	5642641	12	13	9.6	1.0	5643223	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGK445		HGK446		HGK447			
Sampling Date		2018/07/12		2018/07/12		2018/07/12			
COC Number		D33416		D33416		D33416			
	UNITS	**2018-BH04-GP01**	**QC Batch**	**2018-BH04-GP05**	**QC Batch**	**2018-BH03-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	15	5643223	14	5638054	14	1.0	5643223	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGK449	HGK449			
Sampling Date		2018/07/12	2018/07/12			
COC Number		D33416	D33416			
	UNITS	**2018-BH03-GP07**	**2018-BH03-GP07 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics						
Moisture	%	15	14	1.0	5643223	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGK249	HGK387	HGK389	HGK390			
Sampling Date		2018/07/12	2018/07/12	2018/07/12	2018/07/12			
COC Number		D33414	D33415	D33415	D33415			
	UNITS	**2018-MW11-GP08**	**2018-BH12-GP02**	**2018-BH64-GP02**	**2018-BH10-GP01**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	4600	3800	5000	4700	10	5646198	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	9.4	2.0	5646198	N/A
Acid Extractable Barium (Ba)	mg/kg	50	47	57	50	5.0	5646198	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5646198	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5646198	N/A
Acid Extractable Chromium (Cr)	mg/kg	9.1	4.0	9.3	6.8	2.0	5646198	N/A
Acid Extractable Cobalt (Co)	mg/kg	3.7	2.7	4.0	2.8	1.0	5646198	N/A
Acid Extractable Copper (Cu)	mg/kg	7.2	7.2	8.6	12	2.0	5646198	N/A
Acid Extractable Iron (Fe)	mg/kg	13000	11000	15000	12000	50	5646198	N/A
Acid Extractable Lead (Pb)	mg/kg	7.2	5.8	6.6	7.3	0.50	5646198	N/A
Acid Extractable Lithium (Li)	mg/kg	12	9.7	12	12	2.0	5646198	N/A
Acid Extractable Manganese (Mn)	mg/kg	170	130	170	130	2.0	5646198	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5646198	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Nickel (Ni)	mg/kg	4.2	3.7	5.6	4.3	2.0	5646198	N/A
Acid Extractable Rubidium (Rb)	mg/kg	7.4	8.1	8.2	8.1	2.0	5646198	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5646198	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5646198	N/A
Acid Extractable Strontium (Sr)	mg/kg	<5.0	5.4	7.9	7.7	5.0	5646198	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5646198	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Uranium (U)	mg/kg	0.75	0.67	0.72	0.88	0.10	5646198	N/A
Acid Extractable Vanadium (V)	mg/kg	16	8.1	14	14	2.0	5646198	N/A
Acid Extractable Zinc (Zn)	mg/kg	36	30	40	34	5.0	5646198	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGK394	HGK448			
Sampling Date		2018/07/12	2018/07/12			
COC Number		D33415	D33416			
	UNITS	**2018-MW09-GP02**	**2018-BH03-GP02**	**RDL**	**QC Batch**	**MDL**
Metals						
Acid Extractable Aluminum (Al)	mg/kg	3400	3400	10	5646198	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Barium (Ba)	mg/kg	46	64	5.0	5646198	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	50	5646198	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	0.30	5646198	N/A
Acid Extractable Chromium (Cr)	mg/kg	4.6	3.6	2.0	5646198	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.7	2.9	1.0	5646198	N/A
Acid Extractable Copper (Cu)	mg/kg	5.4	7.7	2.0	5646198	N/A
Acid Extractable Iron (Fe)	mg/kg	9900	9300	50	5646198	N/A
Acid Extractable Lead (Pb)	mg/kg	4.6	5.0	0.50	5646198	N/A
Acid Extractable Lithium (Li)	mg/kg	8.9	8.6	2.0	5646198	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	110	2.0	5646198	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.10	5646198	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.5	4.4	2.0	5646198	N/A
Acid Extractable Rubidium (Rb)	mg/kg	6.3	6.0	2.0	5646198	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	1.0	5646198	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	0.50	5646198	N/A
Acid Extractable Strontium (Sr)	mg/kg	<5.0	<5.0	5.0	5646198	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	0.10	5646198	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	2.0	5646198	N/A
Acid Extractable Uranium (U)	mg/kg	0.53	0.83	0.10	5646198	N/A
Acid Extractable Vanadium (V)	mg/kg	7.9	7.1	2.0	5646198	N/A
Acid Extractable Zinc (Zn)	mg/kg	28	28	5.0	5646198	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGK248	HGK255	HGK391			HGK446			
Sampling Date		2018/07/11	2018/07/12	2018/07/12			2018/07/12			
COC Number		D33414	D33414	D33415			D33416			
	UNITS	**2018-BH15-GP01**	**2018-BH13-GP07**	**2018-BH10-GP02**	**RDL**	**QC Batch**	**2018-BH04-GP05**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	1.1	0.010	5642531	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	1.5	0.010	5642531	N/A
Acenaphthene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.030 (1)	0.030	5642531	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.050 (1)	0.050	5642531	N/A
Anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	0.020	5636685	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Chrysene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Fluorene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	0.091	0.010	5642531	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Naphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	0.38	0.010	5642531	N/A
Perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Phenanthrene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	0.037	0.010	5642531	N/A
Pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5644809	<0.010	0.010	5642531	N/A
Surrogate Recovery (%)										
D10-Anthracene	%	90	89	87		5644809	103		5642531	
D14-Terphenyl (FS)	%	92	98	93		5644809	94		5642531	
D8-Acenaphthylene	%	88	89	88		5644809	95		5642531	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGK447	HGK449			
Sampling Date		2018/07/12	2018/07/12			
COC Number		D33416	D33416			
	UNITS	**2018-BH03-GP01**	**2018-BH03-GP07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons						
1-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Acenaphthene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Anthracene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Chrysene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Fluoranthene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Fluorene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Naphthalene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Perylene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Phenanthrene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Pyrene	mg/kg	<0.010	<0.010	0.010	5644809	N/A
Surrogate Recovery (%)						
D10-Anthracene	%	87	83		5644809	
D14-Terphenyl (FS)	%	91	90		5644809	
D8-Acenaphthylene	%	85	87		5644809	

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK249		HGK250		HGK251			
Sampling Date		2018/07/12		2018/07/11		2018/07/11			
COC Number		D33414		D33414		D33414			
	UNITS	**2018-MW11-GP08**	**QC Batch**	**2018-BH15-GP02**	**QC Batch**	**2018-BH15-GP08**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	5642266	<0.025	5642266	<0.025	0.025	5642266	N/A
Toluene	mg/kg	<0.025	5642266	<0.025	5642266	<0.025	0.025	5642266	N/A
Ethylbenzene	mg/kg	<0.025	5642266	<0.025	5642266	0.052	0.025	5642266	0.025
Total Xylenes	mg/kg	<0.050	5642266	<0.050	5642266	0.37	0.050	5642266	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	5642266	<2.5	5642266	200	2.5	5642266	N/A
>C10-C16 Hydrocarbons	mg/kg	420	5644125	<10	5642890	2000	10	5644125	N/A
>C16-C21 Hydrocarbons	mg/kg	46	5644125	<10	5642890	99	10	5644125	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	5644125	<15	5642890	<15	15	5644125	N/A
Modified TPH (Tier1)	mg/kg	460	5636755	<15	5636755	2300	15	5636755	N/A
Reached Baseline at C32	mg/kg	Yes	5644125	NA	5642890	Yes	N/A	5644125	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	5644125	NA	5642890	COMMENT (2)	N/A	5644125	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	95	5644125	98	5642890	93		5644125	
n-Dotriacontane - Extractable	%	94	5644125	89	5642890	89		5644125	
Isobutylbenzene - Volatile	%	108 (3)	5642266	106 (3)	5642266	77 (3)		5642266	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) Fuel oil fraction.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK252	HGK253	HGK254	HGK256			
Sampling Date		2018/07/12	2018/07/12	2018/07/12	2018/07/12			
COC Number		D33414	D33414	D33414	D33414			
	UNITS	**2018-MW11-GP08**	**2018-MW62-GP01**	**2018-BH13-GP01**	**2018-BH13-GP08**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642266	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642266	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642266	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5642266	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	2.5	5642266	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	550	<10	<10	10	5644125	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	60	<10	<10	10	5644125	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	22	<15	<15	15	5644125	N/A
Modified TPH (Tier1)	mg/kg	<15	630	<15	<15	15	5636755	N/A
Reached Baseline at C32	mg/kg	NA	Yes	NA	NA	N/A	5644125	N/A
Hydrocarbon Resemblance	mg/kg	NA	COMMENT (1)	NA	NA	N/A	5644125	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	93	95	92	93		5644125	
n-Dotriacontane - Extractable	%	90	91	87	93		5644125	
Isobutylbenzene - Volatile	%	102	108 (2)	140 (3)	143 (4)		5642266	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(4) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK257		HGK386			HGK388			
Sampling Date		2018/07/12		2018/07/12			2018/07/12			
COC Number		D33414		D33415			D33415			
	UNITS	**2018-BH63-GP08**	**QC Batch**	**2018-BH12-GP01**	**RDL**	**QC Batch**	**2018-BH12-GP08**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	5642266	<0.025	0.025	5642266	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	5642266	<0.025	0.025	5642266	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	5642266	<0.025	0.025	5642266	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	<0.050	5642266	<0.050	0.050	5642266	1.2	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	5642266	<2.5	2.5	5642266	61	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	5644125	15	10	5642890	5100	50	5644125	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	5644125	<10	10	5642890	610	50	5644125	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	5644125	<15	15	5642890	<75	75	5644125	N/A
Modified TPH (Tier1)	mg/kg	<15	5638080	15	15	5638080	5800	75	5638080	N/A
Reached Baseline at C32	mg/kg	NA	5644125	Yes	N/A	5642890	Yes	N/A	5644125	N/A
Hydrocarbon Resemblance	mg/kg	NA	5644125	COMMENT (1)	N/A	5642890	COMMENT (2)	N/A	5644125	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	96	5644125	98		5642890	100		5644125	
n-Dotriacontane - Extractable	%	105	5644125	91		5642890	103 (3)		5644125	
Isobutylbenzene - Volatile	%	101	5642266	106 (4)		5642266	42 (5)		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Weathered fuel oil fraction.
(2) Fuel oil fraction.
(3) Elevated TEH RDL(s) due to sample dilution.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(5) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK388				HGK390			
Sampling Date		2018/07/12				2018/07/12			
COC Number		D33415				D33415			
	UNITS	**2018-BH12-GP08 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-BH10-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5642311	N/A	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	0.025	5642311	N/A	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5642311	0.025	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	1.2	0.050	5642311	N/A	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	66	2.5	5642311	N/A	<2.5	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg					<10	10	5644125	N/A
>C16-C21 Hydrocarbons	mg/kg					<10	10	5644125	N/A
>C21-<C32 Hydrocarbons	mg/kg					<15	15	5644125	N/A
Modified TPH (Tier1)	mg/kg					<15	15	5638080	N/A
Reached Baseline at C32	mg/kg					NA	N/A	5644125	N/A
Hydrocarbon Resemblance	mg/kg					NA	N/A	5644125	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%					89		5644125	
n-Dotriacontane - Extractable	%					82		5644125	
Isobutylbenzene - Volatile	%	43 (1)		5642311		110		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK392		HGK394	HGK445			
Sampling Date		2018/07/12		2018/07/12	2018/07/12			
COC Number		D33415		D33415	D33416			
	UNITS	**2018-BH10-GP08**	**QC Batch**	**2018-MW09-GP02**	**2018-BH04-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	5642311	<0.025	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	5642311	<0.025	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	0.063	5642311	<0.025	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	2.7	5642311	<0.050	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	120	5642311	<2.5	71	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	2200	5642890	<10	3000	10	5644125	N/A
>C16-C21 Hydrocarbons	mg/kg	220	5642890	<10	210	10	5644125	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	5642890	<15	20	15	5644125	N/A
Modified TPH (Tier1)	mg/kg	2500	5638080	<15	3300	15	5638080	N/A
Reached Baseline at C32	mg/kg	Yes	5642890	NA	Yes	N/A	5644125	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	5642890	NA	COMMENT (1)	N/A	5644125	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	80	5642890	89	95		5644125	
n-Dotriacontane - Extractable	%	94	5642890	83 (2)	80		5644125	
Isobutylbenzene - Volatile	%	41 (3)	5642311	113 (4)	52 (5)		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(5) VPH surrogate not within acceptance limits. Analysis was repeated with similar results. VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK446				HGK446			
Sampling Date		2018/07/12				2018/07/12			
COC Number		D33416				D33416			
	UNITS	**2018-BH04-GP05**	**RDL**	**QC Batch**	**MDL**	**2018-BH04-GP05 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5647302	N/A	<0.025	0.025	5647302	N/A
Toluene	mg/kg	<0.025	0.025	5647302	N/A	<0.025	0.025	5647302	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5647302	0.025	<0.025	0.025	5647302	0.025
Total Xylenes	mg/kg	<0.050	0.050	5647302	N/A	<0.050	0.050	5647302	N/A
C6 - C10 (less BTEX)	mg/kg	6.2	2.5	5647302	N/A	7.4	2.5	5647302	N/A
>C10-C16 Hydrocarbons	mg/kg	72	10	5644017	N/A				
>C16-C21 Hydrocarbons	mg/kg	<10	10	5644017	N/A				
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5644017	N/A				
Modified TPH (Tier1)	mg/kg	79	15	5636755	N/A				
Reached Baseline at C32	mg/kg	Yes	N/A	5644017	N/A				
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	N/A	5644017	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	86		5644017					
n-Dotriacontane - Extractable	%	81		5644017					
Isobutylbenzene - Volatile	%	102 (2)		5647302		107 (2)		5647302	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGK447		HGK449			
Sampling Date		2018/07/12		2018/07/12			
COC Number		D33416		D33416			
	UNITS	**2018-BH03-GP01**	**QC Batch**	**2018-BH03-GP07**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons							
Benzene	mg/kg	<0.025	5642311	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	5642311	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	5642311	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	<0.050	5642311	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	5642311	<2.5	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	5644125	<10	10	5644045	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	5644125	<10	10	5644045	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	5644125	<15	15	5644045	N/A
Modified TPH (Tier1)	mg/kg	<15	5638080	<15	15	5638080	N/A
Reached Baseline at C32	mg/kg	NA	5644125	NA	N/A	5644045	N/A
Hydrocarbon Resemblance	mg/kg	NA	5644125	NA	N/A	5644045	N/A
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	91	5644125	91		5644045	
n-Dotriacontane - Extractable	%	85	5644125	98		5644045	
Isobutylbenzene - Volatile	%	99 (1)	5642311	97 (1)		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HGK393	HGK395			
Sampling Date		2018/07/12	2018/07/12			
COC Number		D33415	D33415			
	UNITS	**2018-MW09-GP01**	**2018-MW66-GP01**	**RDL**	**QC Batch**	**MDL**
PCBs						
Aroclor 1016	ug/g	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1221	ug/g	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1232	ug/g	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1248	ug/g	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1242	ug/g	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1254	ug/g	0.14	0.10	0.050	5644743	N/A
Aroclor 1260	ug/g	<0.050	<0.050	0.050	5644743	N/A
Calculated Total PCB	ug/g	0.14	0.10	0.050	5638073	N/A
Surrogate Recovery (%)						
Decachlorobiphenyl	%	96	93		5644743	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK248
Sample ID: 2018-BH15-GP01
Matrix: Soil

Collected: 2018/07/11
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale

Maxxam ID: HGK249
Sample ID: 2018-MW11-GP08
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/24	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK250
Sample ID: 2018-BH15-GP02
Matrix: Soil

Collected: 2018/07/11
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642233	N/A	2018/07/23	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK251
Sample ID: 2018-BH15-GP08
Matrix: Soil

Collected: 2018/07/11
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK252
Sample ID: 2018-MW11-GP08
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HGK253
Sample ID: 2018-MW62-GP01
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK254
Sample ID: 2018-BH13-GP01
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK255
Sample ID: 2018-BH13-GP07
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale

Maxxam ID: HGK256
Sample ID: 2018-BH13-GP08
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642726	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK257
Sample ID: 2018-BH63-GP08
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK386 **Collected:** 2018/07/12
Sample ID: 2018-BH12-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642266	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK387 **Collected:** 2018/07/12
Sample ID: 2018-BH12-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine

Maxxam ID: HGK388 **Collected:** 2018/07/12
Sample ID: 2018-BH12-GP08 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK388 Dup **Collected:** 2018/07/12
Sample ID: 2018-BH12-GP08 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK389 **Collected:** 2018/07/12
Sample ID: 2018-BH64-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine

Maxxam ID: HGK390 **Collected:** 2018/07/12
Sample ID: 2018-BH10-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk

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TEST SUMMARY

Maxxam ID: HGK390 **Collected:** 2018/07/12
Sample ID: 2018-BH10-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK391 **Collected:** 2018/07/12
Sample ID: 2018-BH10-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/23	2018/07/25	Kelly Gale

Maxxam ID: HGK392 **Collected:** 2018/07/12
Sample ID: 2018-BH10-GP08 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642890	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5642641	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK393 **Collected:** 2018/07/12
Sample ID: 2018-MW09-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
PCBs in soil by GC/ECD	GC/ECD	5644743	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/25	Automated Statchk

Maxxam ID: HGK394 **Collected:** 2018/07/12
Sample ID: 2018-MW09-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK395 **Collected:** 2018/07/12
Sample ID: 2018-MW66-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
PCBs in soil by GC/ECD	GC/ECD	5644743	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/25	Automated Statchk

Maxxam ID: HGK445 **Collected:** 2018/07/12
Sample ID: 2018-BH04-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK446 **Collected:** 2018/07/12
Sample ID: 2018-BH04-GP05 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/25	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644017	2018/07/24	2018/07/24	Marley Gidney
Moisture	BAL	5638054	N/A	2018/07/20	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5642531	2018/07/23	2018/07/24	Lisa Gates
VPH in Soil (PIRI)	PTGC/MS	5647302	2018/07/19	2018/07/26	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5636755	N/A	2018/07/26	Automated Statchk

Maxxam ID: HGK446 Dup **Collected:** 2018/07/12
Sample ID: 2018-BH04-GP05 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI)	PTGC/MS	5647302	2018/07/25	2018/07/26	Jacob Henley

Maxxam ID: HGK447 **Collected:** 2018/07/12
Sample ID: 2018-BH03-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644125	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGK448
Sample ID: 2018-BH03-GP02
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine

Maxxam ID: HGK449
Sample ID: 2018-BH03-GP07
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/24	Marsha (Skinner) Harnum
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/23	2018/07/25	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638080	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGK449 Dup
Sample ID: 2018-BH03-GP07
Matrix: Soil

Collected: 2018/07/12
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5643223	N/A	2018/07/23	David Balfour

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	8.4°C

Lab preservation performed on sample 2018-BH04-GP05. Analytical results for VPH parameters should be regarded as minimum.

Results relate only to the items tested.

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642266	Isobutylbenzene - Volatile	2018/07/23	117	60 - 130	94	60 - 130	96	%		
5642311	Isobutylbenzene - Volatile	2018/07/23	48 (1)	60 - 130	100	60 - 130	94	%		
5642531	D10-Anthracene	2018/07/24	101	50 - 130	99	50 - 130	103	%		
5642531	D14-Terphenyl (FS)	2018/07/24	92	50 - 130	92	50 - 130	102	%		
5642531	D8-Acenaphthylene	2018/07/24	94	50 - 130	98	50 - 130	100	%		
5642890	Isobutylbenzene - Extractable	2018/07/23	103	60 - 130	100	60 - 130	99	%		
5642890	n-Dotriacontane - Extractable	2018/07/23	118	60 - 130	94	60 - 130	87	%		
5644017	Isobutylbenzene - Extractable	2018/07/24	87	60 - 130	90	60 - 130	91	%		
5644017	n-Dotriacontane - Extractable	2018/07/24	98	60 - 130	91	60 - 130	89	%		
5644045	Isobutylbenzene - Extractable	2018/07/24	90	60 - 130	91	60 - 130	90	%		
5644045	n-Dotriacontane - Extractable	2018/07/24	99	60 - 130	99	60 - 130	99	%		
5644125	Isobutylbenzene - Extractable	2018/07/24	95	60 - 130	94	60 - 130	95	%		
5644125	n-Dotriacontane - Extractable	2018/07/24	94	60 - 130	84	60 - 130	93	%		
5644743	Decachlorobiphenyl	2018/07/25	91	70 - 130	89	70 - 130	95	%		
5644809	D10-Anthracene	2018/07/25	92	50 - 130	88	50 - 130	91	%		
5644809	D14-Terphenyl (FS)	2018/07/25	95	50 - 130	95	50 - 130	101	%		
5644809	D8-Acenaphthylene	2018/07/25	89	50 - 130	92	50 - 130	92	%		
5647302	Isobutylbenzene - Volatile	2018/07/26	95 (2)	60 - 130	106	60 - 130	104	%		
5638054	Moisture	2018/07/20							7.5	25
5642233	Moisture	2018/07/23							8.6	25
5642266	Benzene	2018/07/23	90	60 - 130	94	60 - 140	<0.025	mg/kg	NC	50
5642266	C6 - C10 (less BTEX)	2018/07/23					<2.5	mg/kg	NC	50
5642266	Ethylbenzene	2018/07/23	92	60 - 130	96	60 - 140	<0.025	mg/kg	NC	50
5642266	Toluene	2018/07/23	86	60 - 130	95	60 - 140	<0.025	mg/kg	NC	50
5642266	Total Xylenes	2018/07/23	89	60 - 130	93	60 - 140	<0.050	mg/kg	NC	50
5642311	Benzene	2018/07/23	104	60 - 130	84	60 - 140	<0.025	mg/kg	NC	50
5642311	C6 - C10 (less BTEX)	2018/07/23					<2.5	mg/kg	7.1	50
5642311	Ethylbenzene	2018/07/23	105	60 - 130	86	60 - 140	<0.025	mg/kg	NC	50
5642311	Toluene	2018/07/23	102	60 - 130	84	60 - 140	<0.025	mg/kg	NC	50
5642311	Total Xylenes	2018/07/23	113	60 - 130	89	60 - 140	<0.050	mg/kg	0.90	50
5642531	1-Methylnaphthalene	2018/07/24	89	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642531	2-Methylnaphthalene	2018/07/24	95	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642531	Acenaphthene	2018/07/24	96	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642531	Acenaphthylene	2018/07/24	109	50 - 130	111	50 - 130	<0.010	mg/kg	NC	50
5642531	Anthracene	2018/07/24	92	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(a)anthracene	2018/07/24	92	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(a)pyrene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(b)fluoranthene	2018/07/24	107	50 - 130	109	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(g,h,i)perylene	2018/07/24	98	50 - 130	101	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(j)fluoranthene	2018/07/24	97	50 - 130	100	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(k)fluoranthene	2018/07/24	105	50 - 130	106	50 - 130	<0.010	mg/kg	NC	50
5642531	Chrysene	2018/07/24	89	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5642531	Dibenz(a,h)anthracene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Fluoranthene	2018/07/24	94	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Fluorene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Indeno(1,2,3-cd)pyrene	2018/07/24	88	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5642531	Naphthalene	2018/07/24	91	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642531	Perylene	2018/07/24	94	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642531	Phenanthrene	2018/07/24	86	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Pyrene	2018/07/24	97	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5642641	Moisture	2018/07/23							6.3	25
5642726	Moisture	2018/07/23							2.1	25
5642890	>C10-C16 Hydrocarbons	2018/07/24	99	30 - 130	93	60 - 130	<10	mg/kg	NC	50
5642890	>C16-C21 Hydrocarbons	2018/07/24	94	30 - 130	87	60 - 130	<10	mg/kg	NC	50
5642890	>C21-<C32 Hydrocarbons	2018/07/24	110	30 - 130	109	60 - 130	<15	mg/kg	5.7	50
5643223	Moisture	2018/07/23							4.1	25
5644017	>C10-C16 Hydrocarbons	2018/07/24	85	30 - 130	86	60 - 130	<10	mg/kg	NC	50
5644017	>C16-C21 Hydrocarbons	2018/07/24	83	30 - 130	81	60 - 130	<10	mg/kg	30	50
5644017	>C21-<C32 Hydrocarbons	2018/07/24	100	30 - 130	97	60 - 130	<15	mg/kg	6.9	50
5644045	>C10-C16 Hydrocarbons	2018/07/25	89	30 - 130	90	60 - 130	<10	mg/kg	NC	50
5644045	>C16-C21 Hydrocarbons	2018/07/25	91	30 - 130	90	60 - 130	<10	mg/kg	NC	50
5644045	>C21-<C32 Hydrocarbons	2018/07/25	114	30 - 130	115	60 - 130	<15	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5644125	>C10-C16 Hydrocarbons	2018/07/25	102	30 - 130	99	60 - 130	<10	mg/kg	NC	50
5644125	>C16-C21 Hydrocarbons	2018/07/25	92	30 - 130	89	60 - 130	<10	mg/kg	NC	50
5644125	>C21-<C32 Hydrocarbons	2018/07/25	114	30 - 130	110	60 - 130	<15	mg/kg	NC	50
5644743	Aroclor 1016	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1221	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1232	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1242	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1248	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1254	2018/07/25	107	70 - 130	106	70 - 130	<0.050	ug/g	NC	50
5644743	Aroclor 1260	2018/07/25					<0.050	ug/g	NC	50
5644809	1-Methylnaphthalene	2018/07/25	86	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5644809	2-Methylnaphthalene	2018/07/25	93	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5644809	Acenaphthene	2018/07/25	90	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5644809	Acenaphthylene	2018/07/25	92	50 - 130	95	50 - 130	<0.010	mg/kg	21	50
5644809	Anthracene	2018/07/25	92	50 - 130	97	50 - 130	<0.010	mg/kg	6.4	50
5644809	Benzo(a)anthracene	2018/07/25	95	50 - 130	96	50 - 130	<0.010	mg/kg	18	50
5644809	Benzo(a)pyrene	2018/07/25	82	50 - 130	84	50 - 130	<0.010	mg/kg	0.19	50
5644809	Benzo(b)fluoranthene	2018/07/25	81	50 - 130	88	50 - 130	<0.010	mg/kg	5.7	50
5644809	Benzo(g,h,i)perylene	2018/07/25	92	50 - 130	93	50 - 130	<0.010	mg/kg	5.9	50
5644809	Benzo(j)fluoranthene	2018/07/25	79	50 - 130	80	50 - 130	<0.010	mg/kg	10	50
5644809	Benzo(k)fluoranthene	2018/07/25	82	50 - 130	86	50 - 130	<0.010	mg/kg	3.5	50
5644809	Chrysene	2018/07/25	86	50 - 130	88	50 - 130	<0.010	mg/kg	14	50
5644809	Dibenz(a,h)anthracene	2018/07/25	80	50 - 130	75	50 - 130	<0.010	mg/kg	NC	50
5644809	Fluoranthene	2018/07/25	92	50 - 130	95	50 - 130	<0.010	mg/kg	23	50
5644809	Fluorene	2018/07/25	95	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5644809	Indeno(1,2,3-cd)pyrene	2018/07/25	80	50 - 130	80	50 - 130	<0.010	mg/kg	0	50
5644809	Naphthalene	2018/07/25	87	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5644809	Perylene	2018/07/25	84	50 - 130	85	50 - 130	<0.010	mg/kg	2.9	50
5644809	Phenanthrene	2018/07/25	99	50 - 130	84	50 - 130	<0.010	mg/kg	25	50
5644809	Pyrene	2018/07/25	92	50 - 130	97	50 - 130	<0.010	mg/kg	20	50
5646198	Acid Extractable Aluminum (Al)	2018/07/25					<10	mg/kg	5.6	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5646198	Acid Extractable Antimony (Sb)	2018/07/25	96	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Arsenic (As)	2018/07/25	110	75 - 125	100	75 - 125	<2.0	mg/kg	4.7	35
5646198	Acid Extractable Barium (Ba)	2018/07/25	100	75 - 125	98	75 - 125	<5.0	mg/kg	0.22	35
5646198	Acid Extractable Beryllium (Be)	2018/07/25	105	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Bismuth (Bi)	2018/07/25	100	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Boron (B)	2018/07/25	103	75 - 125	109	75 - 125	<50	mg/kg	NC	35
5646198	Acid Extractable Cadmium (Cd)	2018/07/25	101	75 - 125	98	75 - 125	<0.30	mg/kg	NC	35
5646198	Acid Extractable Chromium (Cr)	2018/07/25	107	75 - 125	103	75 - 125	<2.0	mg/kg	6.5	35
5646198	Acid Extractable Cobalt (Co)	2018/07/25	105	75 - 125	103	75 - 125	<1.0	mg/kg	10	35
5646198	Acid Extractable Copper (Cu)	2018/07/25	98	75 - 125	103	75 - 125	<2.0	mg/kg	11	35
5646198	Acid Extractable Iron (Fe)	2018/07/25					<50	mg/kg	5.5	35
5646198	Acid Extractable Lead (Pb)	2018/07/25	100	75 - 125	96	75 - 125	<0.50	mg/kg	25	35
5646198	Acid Extractable Lithium (Li)	2018/07/25	103	75 - 125	98	75 - 125	<2.0	mg/kg	4.2	35
5646198	Acid Extractable Manganese (Mn)	2018/07/25	NC	75 - 125	101	75 - 125	<2.0	mg/kg	4.0	35
5646198	Acid Extractable Mercury (Hg)	2018/07/25	95	75 - 125	103	75 - 125	<0.10	mg/kg	NC	35
5646198	Acid Extractable Molybdenum (Mo)	2018/07/25	101	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Nickel (Ni)	2018/07/25	105	75 - 125	105	75 - 125	<2.0	mg/kg	6.8	35
5646198	Acid Extractable Rubidium (Rb)	2018/07/25	98	75 - 125	95	75 - 125	<2.0	mg/kg	0.61	35
5646198	Acid Extractable Selenium (Se)	2018/07/25	103	75 - 125	105	75 - 125	<1.0	mg/kg	NC	35
5646198	Acid Extractable Silver (Ag)	2018/07/25	100	75 - 125	100	75 - 125	<0.50	mg/kg	NC	35
5646198	Acid Extractable Strontium (Sr)	2018/07/25	105	75 - 125	96	75 - 125	<5.0	mg/kg	2.7	35
5646198	Acid Extractable Thallium (Tl)	2018/07/25	103	75 - 125	100	75 - 125	<0.10	mg/kg	NC	35
5646198	Acid Extractable Tin (Sn)	2018/07/25	100	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Uranium (U)	2018/07/25	99	75 - 125	96	75 - 125	<0.10	mg/kg	11	35
5646198	Acid Extractable Vanadium (V)	2018/07/25	106	75 - 125	102	75 - 125	<2.0	mg/kg	5.3	35
5646198	Acid Extractable Zinc (Zn)	2018/07/25	104	75 - 125	99	75 - 125	<5.0	mg/kg	11	35
5647302	Benzene	2018/07/26	85	60 - 130	102	60 - 140	<0.025	mg/kg	NC	50
5647302	C6 - C10 (less BTEX)	2018/07/26					<2.5	mg/kg	17	50
5647302	Ethylbenzene	2018/07/26	86	60 - 130	98	60 - 140	<0.025	mg/kg	NC	50
5647302	Toluene	2018/07/26	82	60 - 130	99	60 - 140	<0.025	mg/kg	NC	50

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Maxxam Job #: B8I1522
Report Date: 2018/07/26

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5647302	Total Xylenes	2018/07/26	83	60 - 130	97	60 - 140	<0.050	mg/kg	NC	50

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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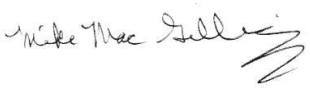
Maxxam Job #: B8I1522
Report Date: 2018/07/26

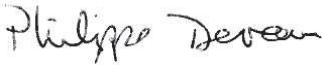
Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, Scientific Specialist (Organics)

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CHAIN OF CUSTODY RECORD

COC #: D 33414 Page 1 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	☒ Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.6 8.7 8.0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H.	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-BH15-GP01	2018/07/11		Soil																	X							
2	2018-MW11-GP01	2018/07/12											X				X											
3	2018-BH15-GP02	2018/07/11															X											
4	2018-BH15-GP08	"	"														X											
5	2018-MW11-GP08	2018/07/12															X											
6	2018-MW62-GP01																X											
7	2018-BH13-GP01																X											
8	2018-BH13-GP07																				X							
9	2018-BH13-GP08																X											
10	2018-BH63-GP08	↓		↓													X											

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Bolton	2018/07/18	10:00	B8I1522

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JUL 18 2018

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CHAIN OF CUSTODY RECORD

COC #: D33415 Page 2 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Keetsey Drive St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.0 8.7 8.0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/Soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE
1	2018-BH12-GP01	2018/07/12		Soil													X											
2	2018-BH12-GP02												X															
3	2018-BH12-GP08																X											
4	2018-BH64-GP02												X															
5	2018-BH10-GP01												X				X											
6	2018-BH10-GP02																				X							
7	2018-BH10-GP08																X											
8	2018-MW09-GP01																						X					
9	2018-MW09-GP02												X				X											
10	2018-MW66-GP01																						X					

Regulatory Requirements (Specify)

COMMENTS

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Sollows	2018/07/18	10:00	B8I522

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CHAIN OF CUSTODY RECORD

COC #: D33416 Page 3 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	X Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.0 8.7 8.0	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/Soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018 - BH04 - GP01	2018/07/12		soil													X											
2	2018 - BH04 - GP05	↓		↓													X				X							
3	2018 - BH03 - GP01																X				X							
4	2018 - BH03 - GP02												X															
5	2018 - BH03 - GP07																X				X							
6																												
7																												
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Lofthouse	2018/07/18	10:00	B8I1522

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33435, D33413

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/26
Report #: R5319295
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1817
Received: 2018/07/19, 10:08

Sample Matrix: Soil
Samples Received: 17

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	1	N/A	2018/07/24	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil)	4	N/A	2018/07/26	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	1	2018/07/20	2018/07/21	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	12	2018/07/24	2018/07/25	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	2	2018/07/24	2018/07/25	ATL SOP 00058	EPA 6020A R1 m
Moisture	1	N/A	2018/07/21	ATL SOP 00001	OMOE Handbook 1983 m
Moisture	15	N/A	2018/07/23	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	1	2018/07/23	2018/07/24	ATL SOP 00102	EPA 8270D 2014 m
PAH Compounds by GCMS (SIM) (1)	1	2018/07/23	2018/07/25	ATL SOP 00102	EPA 8270D 2014 m
PAH Compounds by GCMS (SIM) (1)	3	2018/07/24	2018/07/25	ATL SOP 00102	EPA 8270D 2014 m
PCBs in soil by GC/ECD (1)	1	2018/07/23	2018/07/24	ATL SOP 00106	EPA 8082A 2007 m
PCBs in soil by GC/ECD (1)	2	2018/07/24	2018/07/25	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	1	N/A	2018/07/24	N/A	Auto Calc.
PCB Aroclor sum (soil)	2	N/A	2018/07/25	N/A	Auto Calc.
VPH in Soil (PIRI) (2)	1	2018/07/20	2018/07/26	ATL SOP 00119	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	12	N/A	2018/07/25	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	1	N/A	2018/07/26	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (3)	12	N/A	2018/07/23	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33435, D33413

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/26
Report #: R5319295
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1817
Received: 2018/07/19, 10:08

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Sample(s) were not field preserved for VPH when received at the laboratory. Analytical results for VPH parameters should be regarded as minimum values.
(3) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Maxxam
26 Jul 2018 13:52:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGM118	HGM120	HGM121	HGM121			
Sampling Date		2018/07/11	2018/07/11	2018/07/11	2018/07/11			
COC Number		D33435	D33435	D33435	D33435			
	UNITS	**2018-MW51-GP03**	**2018-MW53-GP02**	**2018-MW17-GP01**	**2018-MW17-GP01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	14	12	15	15	1.0	5642535	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HGM122	HGM123	HGM124	HGM125			
Sampling Date		2018/07/11	2018/07/11	2018/07/11	2018/07/11			
COC Number		D33435	D33435	D33435	D33435			
	UNITS	**2018-MW17-GP03**	**2018-MW17-GP04**	**2018-BH16-GP03**	**2018-MW14-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	7.3	15	13	12	1.0	5642535	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGM126		HGM127	HGM184	HGM185			
Sampling Date		2018/07/11		2018/07/11	2018/07/11	2018/07/10			
COC Number		D33435		D33435	D33413	D33413			
	UNITS	**2018-MW14-GP03**	**QC Batch**	**2018-MW14-GP07**	**2018-MW60-GP03**	**2018-SS01**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	13	5639024	9.7	9.8	15	1.0	5642535	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGM186	HGM187	HGM188	HGM189	HGM190			
Sampling Date		2018/07/10	2018/07/10	2018/07/10	2018/07/10	2018/07/10			
COC Number		D33413	D33413	D33413	D33413	D33413			
	UNITS	**2018-SS02**	**2018-SS03**	**2018-SS04**	**2018-SS05**	**2018-SS06**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	15	14	21	13	12	1.0	5642535	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGM119	HGM119	HGM190			
Sampling Date		2018/07/11	2018/07/11	2018/07/10			
COC Number		D33435	D33435	D33413			
	UNITS	**2018-MW53-GP01**	**2018-MW53-GP01 Lab-Dup**	**2018-SS06**	**RDL**	**QC Batch**	**MDL**
Metals							
Acid Extractable Aluminum (Al)	mg/kg	4900	3900	4700	10	5644055	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Barium (Ba)	mg/kg	33	28	33	5.0	5644055	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	5644055	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	0.30	5644055	N/A
Acid Extractable Chromium (Cr)	mg/kg	6.6	3.6	5.9	2.0	5644055	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.8	2.4	2.5	1.0	5644055	N/A
Acid Extractable Copper (Cu)	mg/kg	5.3	4.4	5.3	2.0	5644055	N/A
Acid Extractable Iron (Fe)	mg/kg	14000	12000	11000	50	5644055	N/A
Acid Extractable Lead (Pb)	mg/kg	5.3	4.7	7.7	0.50	5644055	N/A
Acid Extractable Lithium (Li)	mg/kg	12	11	9.2	2.0	5644055	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	110	120	2.0	5644055	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	0.10	5644055	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Nickel (Ni)	mg/kg	4.6	3.7	3.4	2.0	5644055	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.5	3.8	6.0	2.0	5644055	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	1.0	5644055	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	5644055	N/A
Acid Extractable Strontium (Sr)	mg/kg	5.2	<5.0	6.2	5.0	5644055	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	0.10	5644055	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Uranium (U)	mg/kg	0.53	0.53	0.71	0.10	5644055	N/A
Acid Extractable Vanadium (V)	mg/kg	13	10	12	2.0	5644055	N/A
Acid Extractable Zinc (Zn)	mg/kg	34	29	31	5.0	5644055	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGM122			HGM125	HGM127			
Sampling Date		2018/07/11			2018/07/11	2018/07/11			
COC Number		D33435			D33435	D33435			
	UNITS	**2018-MW17-GP03**	**RDL**	**QC Batch**	**2018-MW14-GP01**	**2018-MW14-GP07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	0.13	0.010	5642877	<0.010	0.047	0.010	5644809	N/A
2-Methylnaphthalene	mg/kg	0.070	0.010	5642877	<0.010	0.047	0.010	5644809	N/A
Acenaphthene	mg/kg	<0.16 (1)	0.16	5642877	<0.010	<0.010	0.010	5644809	N/A
Acenaphthylene	mg/kg	<0.080 (1)	0.080	5642877	<0.010	<0.010	0.010	5644809	N/A
Anthracene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	5636685	<0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Chrysene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Fluoranthene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Fluorene	mg/kg	0.059	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Naphthalene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Perylene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Phenanthrene	mg/kg	0.088	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Pyrene	mg/kg	<0.010	0.010	5642877	<0.010	<0.010	0.010	5644809	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	91		5642877	85	88		5644809	
D14-Terphenyl (FS)	%	97		5642877	86	91		5644809	
D8-Acenaphthylene	%	92		5642877	87	87		5644809	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGM185		HGM186			
Sampling Date		2018/07/10		2018/07/10			
COC Number		D33413		D33413			
	UNITS	**2018-SS01**	**RDL**	**2018-SS02**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Acenaphthene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Fluorene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	0.010	5644809	N/A
Pyrene	mg/kg	<0.020 (1)	0.020	<0.010	0.010	5644809	N/A
Surrogate Recovery (%)							
D10-Anthracene	%	84		90		5644809	
D14-Terphenyl (FS)	%	90		93		5644809	
D8-Acenaphthylene	%	87		87		5644809	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM118	HGM120	HGM123	HGM124			
Sampling Date		2018/07/11	2018/07/11	2018/07/11	2018/07/11			
COC Number		D33435	D33435	D33435	D33435			
	UNITS	**2018-MW51-GP03**	**2018-MW53-GP02**	**2018-MW17-GP04**	**2018-BH16-GP03**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	110	<2.5	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	1600	<10	10	5644045	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	140	<10	10	5644045	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	<15	15	5644045	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	1800	<15	15	5638081	N/A
Reached Baseline at C32	mg/kg	NA	NA	Yes	NA	N/A	5644045	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	COMMENT (1)	NA	N/A	5644045	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	89	89	110	92		5644045	
n-Dotriacontane - Extractable	%	96	96	97	104		5644045	
Isobutylbenzene - Volatile	%	23 (2)	104	61 (3)	126 (3)		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Weathered fuel oil fraction.
(2) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM126		HGM127		HGM184			
Sampling Date		2018/07/11		2018/07/11		2018/07/11			
COC Number		D33435		D33435		D33413			
	UNITS	**2018-MW14-GP03**	**QC Batch**	**2018-MW14-GP07**	**QC Batch**	**2018-MW60-GP03**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	5647302	<0.025	5642311	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	5647302	<0.025	5642311	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	5647302	<0.025	5642311	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	<0.050	5647302	<0.050	5642311	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	5647302	18	5642311	3.6	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	17	5640071	39	5644045	15	10	5644045	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	5640071	<10	5644045	<10	10	5644045	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	5640071	<15	5644045	<15	15	5644045	N/A
Modified TPH (Tier1)	mg/kg	17	5638993	57	5638081	19	15	5638208	N/A
Reached Baseline at C32	mg/kg	Yes	5640071	Yes	5644045	Yes	N/A	5644045	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	5640071	COMMENT (2)	5644045	COMMENT (1)	N/A	5644045	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	104	5640071	93	5644045	95		5644045	
n-Dotriacontane - Extractable	%	110	5640071	111	5644045	106 (3)		5644045	
Isobutylbenzene - Volatile	%	112 (4)	5647302						
Isobutylbenzene - Volatile	%			101 (4)	5642311	99		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) Fuel oil fraction.
(3) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM185	HGM186	HGM187	HGM188	HGM189	HGM190			
Sampling Date		2018/07/10	2018/07/10	2018/07/10	2018/07/10	2018/07/10	2018/07/10			
COC Number		D33413	D33413	D33413	D33413	D33413	D33413			
	UNITS	**2018-SS01**	**2018-SS02**	**2018-SS03**	**2018-SS04**	**2018-SS05**	**2018-SS06**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5642311	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5642311	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5642311	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5642311	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	10	<2.5	<2.5	<2.5	2.5	5642311	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	2800	<10	<10	<10	10	5644045	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	460	<10	<10	<10	10	5644045	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	27	<15	<15	<15	15	5644045	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	3300	<15	<15	<15	15	5638208	N/A
Reached Baseline at C32	mg/kg	NA	NA	Yes	NA	NA	NA	N/A	5644045	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	COMMENT (1)	NA	NA	NA	N/A	5644045	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	90	89	100	90	88	88		5644045	
n-Dotriacontane - Extractable	%	89	96	91 (2)	99	100	99		5644045	
Isobutylbenzene - Volatile	%	107 (3)	82	55 (4)	96 (3)	101	23 (5)		5642311	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Weathered fuel oil fraction.
(2) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(4) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(5) VPH surrogate not within acceptance limits. Analysis was repeated with similar results. VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HGM121		HGM125	HGM187			
Sampling Date		2018/07/11		2018/07/11	2018/07/10			
COC Number		D33435		D33435	D33413			
	UNITS	**2018-MW17-GP01**	**QC Batch**	**2018-MW14-GP01**	**2018-SS03**	**RDL**	**QC Batch**	**MDL**
PCBs								
Aroclor 1016	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1221	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1232	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1248	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1242	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1254	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Aroclor 1260	ug/g	<0.050	5642779	<0.050	<0.050	0.050	5644743	N/A
Calculated Total PCB	ug/g	<0.050	5638073	<0.050	<0.050	0.050	5638073	N/A
Surrogate Recovery (%)								
Decachlorobiphenyl	%	87	5642779	92	93		5644743	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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TEST SUMMARY

Maxxam ID: HGM118 **Collected:** 2018/07/11
Sample ID: 2018-MW51-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM119 **Collected:** 2018/07/11
Sample ID: 2018-MW53-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery

Maxxam ID: HGM119 Dup **Collected:** 2018/07/11
Sample ID: 2018-MW53-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery

Maxxam ID: HGM120 **Collected:** 2018/07/11
Sample ID: 2018-MW53-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM121 **Collected:** 2018/07/11
Sample ID: 2018-MW17-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PCBs in soil by GC/ECD	GC/ECD	5642779	2018/07/23	2018/07/24	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/24	Automated Statchk

Maxxam ID: HGM121 Dup **Collected:** 2018/07/11
Sample ID: 2018-MW17-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM122 **Collected:** 2018/07/11
Sample ID: 2018-MW17-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/24	Automated Statchk
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5642877	2018/07/23	2018/07/24	Kelly Gale

Maxxam ID: HGM123 **Collected:** 2018/07/11
Sample ID: 2018-MW17-GP04 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM124 **Collected:** 2018/07/11
Sample ID: 2018-BH16-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM125 **Collected:** 2018/07/11
Sample ID: 2018-MW14-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5644743	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/25	Automated Statchk

Maxxam ID: HGM126 **Collected:** 2018/07/11
Sample ID: 2018-MW14-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5640071	2018/07/20	2018/07/21	Marley Gidney
Moisture	BAL	5639024	N/A	2018/07/21	Jacob Henley
VPH in Soil (PIRI)	PTGC/MS	5647302	2018/07/20	2018/07/26	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638993	N/A	2018/07/26	Automated Statchk

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM127
Sample ID: 2018-MW14-GP07
Matrix: Soil

Collected: 2018/07/11
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM184
Sample ID: 2018-MW60-GP03
Matrix: Soil

Collected: 2018/07/11
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM185
Sample ID: 2018-SS01
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/24	2018/07/25	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM186
Sample ID: 2018-SS02
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/26	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PAH Compounds by GCMS (SIM)	GC/MS	5644809	2018/07/23	2018/07/25	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

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TEST SUMMARY

Maxxam ID: HGM187
Sample ID: 2018-SS03
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
PCBs in soil by GC/ECD	GC/ECD	5644743	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5638073	N/A	2018/07/25	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM188
Sample ID: 2018-SS04
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM189
Sample ID: 2018-SS05
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM190
Sample ID: 2018-SS06
Matrix: Soil

Collected: 2018/07/10
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5644045	2018/07/24	2018/07/25	Marsha (Skinner) Harnum
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5642535	N/A	2018/07/23	David Balfour
ModTPH (T1) Calc. for Soil	CALC	5638208	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642311	N/A	2018/07/23	Shawn Helmkay

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	3.1°C

Lab preservation performed on sample 2018-MW14-GP03 past the recommended hold time. Analytical results for VPH parameters should be regarded as minimum

Results relate only to the items tested.

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5640071	Isobutylbenzene - Extractable	2018/07/21	124	60 - 130	100	60 - 130	95	%		
5640071	n-Dotriacontane - Extractable	2018/07/21	125	60 - 130	105	60 - 130	100	%		
5642311	Isobutylbenzene - Volatile	2018/07/23	48 (1)	60 - 130	100	60 - 130	94	%		
5642779	Decachlorobiphenyl	2018/07/24	97	70 - 130	96	70 - 130	97	%		
5642877	D10-Anthracene	2018/07/24	90	50 - 130	96	50 - 130	95	%		
5642877	D14-Terphenyl (FS)	2018/07/24	88	50 - 130	94	50 - 130	95	%		
5642877	D8-Acenaphthylene	2018/07/24	96	50 - 130	98	50 - 130	100	%		
5644045	Isobutylbenzene - Extractable	2018/07/24	90	60 - 130	91	60 - 130	90	%		
5644045	n-Dotriacontane - Extractable	2018/07/24	99	60 - 130	99	60 - 130	99	%		
5644743	Decachlorobiphenyl	2018/07/25	91	70 - 130	89	70 - 130	95	%		
5644809	D10-Anthracene	2018/07/25	92	50 - 130	88	50 - 130	91	%		
5644809	D14-Terphenyl (FS)	2018/07/25	95	50 - 130	95	50 - 130	101	%		
5644809	D8-Acenaphthylene	2018/07/25	89	50 - 130	92	50 - 130	92	%		
5647302	Isobutylbenzene - Volatile	2018/07/26	95 (2)	60 - 130	106	60 - 130	104	%		
5639024	Moisture	2018/07/21							19	25
5640071	>C10-C16 Hydrocarbons	2018/07/21	110	30 - 130	90	60 - 130	<10	mg/kg	28	50
5640071	>C16-C21 Hydrocarbons	2018/07/21	104	30 - 130	83	60 - 130	<10	mg/kg	6.6	50
5640071	>C21-<C32 Hydrocarbons	2018/07/21	125	30 - 130	102	60 - 130	<15	mg/kg	8.4	50
5642311	Benzene	2018/07/23	104	60 - 130	84	60 - 140	<0.025	mg/kg	NC	50
5642311	C6 - C10 (less BTEX)	2018/07/23					<2.5	mg/kg	7.1	50
5642311	Ethylbenzene	2018/07/23	105	60 - 130	86	60 - 140	<0.025	mg/kg	NC	50
5642311	Toluene	2018/07/23	102	60 - 130	84	60 - 140	<0.025	mg/kg	NC	50
5642311	Total Xylenes	2018/07/23	113	60 - 130	89	60 - 140	<0.050	mg/kg	0.90	50
5642535	Moisture	2018/07/23							0.68	25
5642779	Aroclor 1016	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1221	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1232	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1242	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1248	2018/07/24					<0.050	ug/g	NC	50
5642779	Aroclor 1254	2018/07/24	109	70 - 130	110	70 - 130	<0.050	ug/g	NC	50
5642779	Aroclor 1260	2018/07/24					<0.050	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642877	1-Methylnaphthalene	2018/07/24	87	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5642877	2-Methylnaphthalene	2018/07/24	95	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5642877	Acenaphthene	2018/07/24	96	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642877	Acenaphthylene	2018/07/24	102	50 - 130	105	50 - 130	<0.010	mg/kg	NC	50
5642877	Anthracene	2018/07/24	97	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(a)anthracene	2018/07/24	98	50 - 130	101	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(a)pyrene	2018/07/24	93	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(b)fluoranthene	2018/07/24	91	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(g,h,i)perylene	2018/07/24	103	50 - 130	103	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(j)fluoranthene	2018/07/24	94	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5642877	Benzo(k)fluoranthene	2018/07/24	92	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5642877	Chrysene	2018/07/24	93	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642877	Dibenz(a,h)anthracene	2018/07/24	91	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5642877	Fluoranthene	2018/07/24	94	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642877	Fluorene	2018/07/24	101	50 - 130	103	50 - 130	<0.010	mg/kg	NC	50
5642877	Indeno(1,2,3-cd)pyrene	2018/07/24	90	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5642877	Naphthalene	2018/07/24	91	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642877	Perylene	2018/07/24	94	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642877	Phenanthrene	2018/07/24	91	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5642877	Pyrene	2018/07/24	98	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5644045	>C10-C16 Hydrocarbons	2018/07/25	89	30 - 130	90	60 - 130	<10	mg/kg	NC	50
5644045	>C16-C21 Hydrocarbons	2018/07/25	91	30 - 130	90	60 - 130	<10	mg/kg	NC	50
5644045	>C21-<C32 Hydrocarbons	2018/07/25	114	30 - 130	115	60 - 130	<15	mg/kg	NC	50
5644055	Acid Extractable Aluminum (Al)	2018/07/25					<10	mg/kg	22	35
5644055	Acid Extractable Antimony (Sb)	2018/07/25	100	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Arsenic (As)	2018/07/25	102	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Barium (Ba)	2018/07/25	90	75 - 125	101	75 - 125	<5.0	mg/kg	16	35
5644055	Acid Extractable Beryllium (Be)	2018/07/25	108	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Bismuth (Bi)	2018/07/25	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Boron (B)	2018/07/25	110	75 - 125	124	75 - 125	<50	mg/kg	NC	35
5644055	Acid Extractable Cadmium (Cd)	2018/07/25	101	75 - 125	102	75 - 125	<0.30	mg/kg	NC	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5644055	Acid Extractable Chromium (Cr)	2018/07/25	98	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Cobalt (Co)	2018/07/25	101	75 - 125	105	75 - 125	<1.0	mg/kg	13	35
5644055	Acid Extractable Copper (Cu)	2018/07/25	101	75 - 125	104	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Iron (Fe)	2018/07/25					<50	mg/kg	15	35
5644055	Acid Extractable Lead (Pb)	2018/07/25	98	75 - 125	102	75 - 125	<0.50	mg/kg	12	35
5644055	Acid Extractable Lithium (Li)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	8.6	35
5644055	Acid Extractable Manganese (Mn)	2018/07/25	NC	75 - 125	105	75 - 125	<2.0	mg/kg	12	35
5644055	Acid Extractable Mercury (Hg)	2018/07/25	97	75 - 125	105	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Molybdenum (Mo)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Nickel (Ni)	2018/07/25	103	75 - 125	107	75 - 125	<2.0	mg/kg	22	35
5644055	Acid Extractable Rubidium (Rb)	2018/07/25	98	75 - 125	101	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Selenium (Se)	2018/07/25	104	75 - 125	107	75 - 125	<1.0	mg/kg	NC	35
5644055	Acid Extractable Silver (Ag)	2018/07/25	101	75 - 125	104	75 - 125	<0.50	mg/kg	NC	35
5644055	Acid Extractable Strontium (Sr)	2018/07/25	99	75 - 125	101	75 - 125	<5.0	mg/kg	3.7	35
5644055	Acid Extractable Thallium (Tl)	2018/07/25	101	75 - 125	102	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Tin (Sn)	2018/07/25	101	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Uranium (U)	2018/07/25	100	75 - 125	102	75 - 125	<0.10	mg/kg	0.19	35
5644055	Acid Extractable Vanadium (V)	2018/07/25	97	75 - 125	105	75 - 125	<2.0	mg/kg	27	35
5644055	Acid Extractable Zinc (Zn)	2018/07/25	89	75 - 125	107	75 - 125	<5.0	mg/kg	15	35
5644743	Aroclor 1016	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1221	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1232	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1242	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1248	2018/07/25					<0.050	ug/g	NC	50
5644743	Aroclor 1254	2018/07/25	107	70 - 130	106	70 - 130	<0.050	ug/g	NC	50
5644743	Aroclor 1260	2018/07/25					<0.050	ug/g	NC	50
5644809	1-Methylnaphthalene	2018/07/25	86	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5644809	2-Methylnaphthalene	2018/07/25	93	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5644809	Acenaphthene	2018/07/25	90	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5644809	Acenaphthylene	2018/07/25	92	50 - 130	95	50 - 130	<0.010	mg/kg	21	50
5644809	Anthracene	2018/07/25	92	50 - 130	97	50 - 130	<0.010	mg/kg	6.4	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5644809	Benzo(a)anthracene	2018/07/25	95	50 - 130	96	50 - 130	<0.010	mg/kg	18	50
5644809	Benzo(a)pyrene	2018/07/25	82	50 - 130	84	50 - 130	<0.010	mg/kg	0.19	50
5644809	Benzo(b)fluoranthene	2018/07/25	81	50 - 130	88	50 - 130	<0.010	mg/kg	5.7	50
5644809	Benzo(g,h,i)perylene	2018/07/25	92	50 - 130	93	50 - 130	<0.010	mg/kg	5.9	50
5644809	Benzo(j)fluoranthene	2018/07/25	79	50 - 130	80	50 - 130	<0.010	mg/kg	10	50
5644809	Benzo(k)fluoranthene	2018/07/25	82	50 - 130	86	50 - 130	<0.010	mg/kg	3.5	50
5644809	Chrysene	2018/07/25	86	50 - 130	88	50 - 130	<0.010	mg/kg	14	50
5644809	Dibenz(a,h)anthracene	2018/07/25	80	50 - 130	75	50 - 130	<0.010	mg/kg	NC	50
5644809	Fluoranthene	2018/07/25	92	50 - 130	95	50 - 130	<0.010	mg/kg	23	50
5644809	Fluorene	2018/07/25	95	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5644809	Indeno(1,2,3-cd)pyrene	2018/07/25	80	50 - 130	80	50 - 130	<0.010	mg/kg	0	50
5644809	Naphthalene	2018/07/25	87	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5644809	Perylene	2018/07/25	84	50 - 130	85	50 - 130	<0.010	mg/kg	2.9	50
5644809	Phenanthrene	2018/07/25	99	50 - 130	84	50 - 130	<0.010	mg/kg	25	50
5644809	Pyrene	2018/07/25	92	50 - 130	97	50 - 130	<0.010	mg/kg	20	50
5647302	Benzene	2018/07/26	85	60 - 130	102	60 - 140	<0.025	mg/kg	NC	50
5647302	C6 - C10 (less BTEX)	2018/07/26					<2.5	mg/kg	17	50
5647302	Ethylbenzene	2018/07/26	86	60 - 130	98	60 - 140	<0.025	mg/kg	NC	50
5647302	Toluene	2018/07/26	82	60 - 130	99	60 - 140	<0.025	mg/kg	NC	50
5647302	Total Xylenes	2018/07/26	83	60 - 130	97	60 - 140	<0.050	mg/kg	NC	50

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I1817
Report Date: 2018/07/26

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Mike MacGillivray, Scientific Specialist (Inorganics)

Phil Deveau, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33435 Page 1 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St John's NL A1B 0L2 Postal Code:	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		3.0, 3.1, 3.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW51-GP03	2018/07/11		soil													X											
2	2018-MW53-GP01	"		"									X															
3	2018-MW53-GP02	"		"													X											
4	2018-MW17-GP01	"		"																		X						
5	2018-MW17-GP03	"		"																	X							
6	2018-MW17-GP04	"		"													X											
7	2018-BH16-GP03	"		"													X											
8	2018-MW14-GP01	"		"																	X		X					
9	2018-MW14-GP03	"		"													X											
10	2018-MW14-GP07	"		"													X				X							

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
				18/7/18	10:00	B8I1817

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

JUL 18 2018

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CHAIN OF CUSTODY RECORD

COC #: D33413 Page 2 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		3.0, 3.1, 3.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS:PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default: for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW60-GP03	2018/07/11		Soil													X				X								
2	2018-SS01	2018/07/10															X				X								
3	2018-SS02	" "															X				X								
4	2018-SS03	" "															X					X							
5	2018-SS04	" "															X												
6	2018-SS05	" "															X												
7	2018-SS06	" "		↓									X				X												
8																													
9																													
10																													

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
				2018/7/18	10:00	B8I1817

White: Maxxam Pink: Client

JUL 18 2018

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33433, D33434

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/02
Report #: R5333716
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1829
Received: 2018/07/19, 10:08

Sample Matrix: Soil
Samples Received: 16

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	4	N/A	2018/07/25	N/A	Auto Calc.
TEH in Soil (AA PIRI)	1	2018/07/23	2018/07/27	ATL SOP 00116	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	1	2018/07/23	2018/07/23	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	4	2018/07/23	2018/07/24	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	4	2018/07/23	2018/07/25	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	1	2018/07/24	2018/07/24	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	2	2018/07/24	2018/07/25	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	1	2018/07/25	2018/07/25	ATL SOP 00058	EPA 6020A R1 m
Moisture	14	N/A	2018/07/21	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	4	2018/07/23	2018/07/24	ATL SOP 00102	EPA 8270D 2014 m
ModTPH (T1) Calc. for Soil	4	N/A	2018/07/24	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	1	N/A	2018/07/25	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	4	N/A	2018/07/26	N/A	Atl. RBCA v3.1 m
ModTPH (T2) Calc. for Soil	1	N/A	2018/08/02	N/A	Atl. RBCA v3 m
VPH in Soil (PIRI2) - Field Preserved (2)	1	N/A	2018/07/31	ATL SOP 00120	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	2	N/A	2018/07/23	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	7	N/A	2018/07/24	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33433, D33434

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/02
Report #: R5333716
Version: 2 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I1829
Received: 2018/07/19, 10:08

dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Maxxam
02 Aug 2018 16:21:27

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226
==========
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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HGM192	HGM192	HGM193	HGM194			
Sampling Date		2018/07/09	2018/07/09	2018/07/09	2018/07/09			
COC Number		D33433	D33433	D33433	D33433			
	UNITS	**2018-MW01-GP02**	**2018-MW01-GP02 Lab-Dup**	**2018-MW01-GP03**	**2018-MW01-GP07**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	14	14	13	14	1.0	5640321	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HGM195	HGM196	HGM197	HGM198			
Sampling Date		2018/07/09	2018/07/09	2018/07/09	2018/07/09			
COC Number		D33433	D33433	D33433	D33433			
	UNITS	**2018-MW02-GP01**	**2018-MW02-GP04**	**2018-MW05-GP02**	**2018-MW06-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	17	17	12	17	1.0	5640321	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGM199	HGM290	HGM291	HGM292			
Sampling Date		2018/07/09	2018/07/09	2018/07/09	2018/07/09			
COC Number		D33433	D33434	D33434	D33434			
	UNITS	**2018-MW06-GP03**	**2018-MW06-GP05**	**2018-MW08-GP01**	**2018-MW18-GP06**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	16	18	12	14	1.0	5640321	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HGM294	HGM295	HGM296			
Sampling Date		2018/07/09	2018/07/09	2018/07/09			
COC Number		D33434	D33434	D33434			
	UNITS	**2018-MW50-GP04**	**2018-MW50-GP05**	**2018-MW52-GP05**	**RDL**	**QC Batch**	**MDL**
Inorganics							
Moisture	%	15	16	15	1.0	5640321	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGM191	HGM191				HGM191			
Sampling Date		2018/07/09	2018/07/09				2018/07/09			
COC Number		D33433	D33433				D33433			
	UNITS	**2018-MW01-GP01**	**2018-MW01-GP01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-MW01-GP01 Lab-Dup 2**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	3500	4600	10	5643978	N/A				
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Barium (Ba)	mg/kg	36	45	5.0	5643978	N/A				
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Boron (B)	mg/kg	<50	<50	50	5643978	N/A				
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	0.30	5643978	N/A				
Acid Extractable Chromium (Cr)	mg/kg	3.5	6.2	2.0	5643978	N/A				
Acid Extractable Cobalt (Co)	mg/kg	1.8	2.7	1.0	5643978	N/A				
Acid Extractable Copper (Cu)	mg/kg	4.5	5.8	2.0	5643978	N/A				
Acid Extractable Iron (Fe)	mg/kg	8600	12000	50	5643978	N/A				
Acid Extractable Lead (Pb)	mg/kg	4.6	5.8	0.50	5643978	N/A				
Acid Extractable Lithium (Li)	mg/kg	8.5	8.8	2.0	5643978	N/A				
Acid Extractable Manganese (Mn)	mg/kg	94	120	2.0	5643978	N/A				
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.10	5643978	N/A				
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Nickel (Ni)	mg/kg	2.9	4.0	2.0	5643978	N/A				
Acid Extractable Rubidium (Rb)	mg/kg	5.0	6.3	2.0	5643978	N/A				
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	1.0	5643978	N/A				
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	0.50	5643978	N/A				
Acid Extractable Strontium (Sr)	mg/kg	<5.0	6.3	5.0	5643978	N/A				
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	0.10	5643978	N/A				
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	2.0	5643978	N/A				
Acid Extractable Uranium (U)	mg/kg	0.59	0.67	0.10	5643978	N/A				
Acid Extractable Vanadium (V)	mg/kg	7.9	13 (1)	2.0	5643978	N/A	8.3	2.0	5643978	N/A
Acid Extractable Zinc (Zn)	mg/kg	22	26	5.0	5643978	N/A				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Poor RPD due to sample inhomogeneity. Results verified by repeat digestion and analysis.

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HGM198		HGM291	HGM293			
Sampling Date		2018/07/09		2018/07/09	2018/07/09			
COC Number		D33433		D33434	D33434			
	UNITS	**2018-MW06-GP01**	**QC Batch**	**2018-MW08-GP01**	**2018-MW50-GP01**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3700	5646198	5300	6700	10	5644055	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Barium (Ba)	mg/kg	41	5646198	55	24	5.0	5644055	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Boron (B)	mg/kg	<50	5646198	<50	<50	50	5644055	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	5646198	<0.30	<0.30	0.30	5644055	N/A
Acid Extractable Chromium (Cr)	mg/kg	5.7	5646198	7.2	5.3	2.0	5644055	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.7	5646198	3.0	1.8	1.0	5644055	N/A
Acid Extractable Copper (Cu)	mg/kg	5.6	5646198	7.2	3.1	2.0	5644055	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	5646198	12000	10000	50	5644055	N/A
Acid Extractable Lead (Pb)	mg/kg	4.5	5646198	6.2	13	0.50	5644055	N/A
Acid Extractable Lithium (Li)	mg/kg	8.1	5646198	9.7	7.1	2.0	5644055	N/A
Acid Extractable Manganese (Mn)	mg/kg	120	5646198	140	83	2.0	5644055	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	5646198	<0.10	<0.10	0.10	5644055	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Nickel (Ni)	mg/kg	4.1	5646198	4.6	2.8	2.0	5644055	N/A
Acid Extractable Rubidium (Rb)	mg/kg	5.8	5646198	7.7	3.9	2.0	5644055	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	5646198	<1.0	<1.0	1.0	5644055	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	5646198	<0.50	<0.50	0.50	5644055	N/A
Acid Extractable Strontium (Sr)	mg/kg	<5.0	5646198	7.3	<5.0	5.0	5644055	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	5646198	<0.10	<0.10	0.10	5644055	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	5646198	<2.0	<2.0	2.0	5644055	N/A
Acid Extractable Uranium (U)	mg/kg	0.64	5646198	0.98	0.54	0.10	5644055	N/A
Acid Extractable Vanadium (V)	mg/kg	13	5646198	13	10	2.0	5644055	N/A
Acid Extractable Zinc (Zn)	mg/kg	26	5646198	32	22	5.0	5644055	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGM193		HGM195		HGM198			
Sampling Date		2018/07/09		2018/07/09		2018/07/09			
COC Number		D33433		D33433		D33433			
	UNITS	**2018-MW01-GP03**	**RDL**	**2018-MW02-GP01**	**RDL**	**2018-MW06-GP01**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	0.010	<0.090 (1)	0.090	<0.010	0.010	5642531	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	<0.22 (1)	0.22	<0.010	0.010	5642531	N/A
Acenaphthene	mg/kg	<0.010	0.010	<0.47 (1)	0.47	<0.010	0.010	5642531	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.070 (1)	0.070	<0.010	0.010	5642531	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Fluorene	mg/kg	<0.010	0.010	<0.15 (1)	0.15	<0.010	0.010	5642531	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.15 (1)	0.15	<0.010	0.010	5642531	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.020 (1)	0.020	<0.010	0.010	5642531	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5642531	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	94		106		100		5642531	
D14-Terphenyl (FS)	%	93		108		91		5642531	
D8-Acenaphthylene	%	93		102		94		5642531	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HGM294			
Sampling Date		2018/07/09			
COC Number		D33434			
	UNITS	**2018-MW50-GP04**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	mg/kg	0.21	0.010	5642531	N/A
2-Methylnaphthalene	mg/kg	0.16	0.010	5642531	N/A
Acenaphthene	mg/kg	<0.15 (1)	0.15	5642531	N/A
Acenaphthylene	mg/kg	<0.10 (1)	0.10	5642531	N/A
Anthracene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	5636685	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	5642531	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	5642531	N/A
Chrysene	mg/kg	<0.010	0.010	5642531	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	5642531	N/A
Fluoranthene	mg/kg	<0.010	0.010	5642531	N/A
Fluorene	mg/kg	0.15	0.010	5642531	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	5642531	N/A
Naphthalene	mg/kg	<0.030 (1)	0.030	5642531	N/A
Perylene	mg/kg	<0.010	0.010	5642531	N/A
Phenanthrene	mg/kg	0.097	0.010	5642531	N/A
Pyrene	mg/kg	<0.010	0.010	5642531	N/A
Surrogate Recovery (%)					
D10-Anthracene	%	94		5642531	
D14-Terphenyl (FS)	%	83		5642531	
D8-Acenaphthylene	%	96		5642531	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM192	HGM194	HGM196	HGM197			
Sampling Date		2018/07/09	2018/07/09	2018/07/09	2018/07/09			
COC Number		D33433	D33433	D33433	D33433			
	UNITS	**2018-MW01-GP02**	**2018-MW01-GP07**	**2018-MW02-GP04**	**2018-MW05-GP02**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642746	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642746	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5642746	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5642746	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	41	<2.5	2.5	5642746	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	1500	<10	10	5642403	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	190	<10	10	5642403	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	<15	15	5642403	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	1700	<15	15	5638081	N/A
Reached Baseline at C32	mg/kg	NA	NA	Yes	NA	N/A	5642403	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	COMMENT (1)	NA	N/A	5642403	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	91	90	86	93		5642403	
n-Dotriacontane - Extractable	%	76	77	93	81		5642403	
Isobutylbenzene - Volatile	%	109 (2)	46 (3)	75	90 (2)		5642746	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM197				HGM199			
Sampling Date		2018/07/09				2018/07/09			
COC Number		D33433				D33433			
	UNITS	**2018-MW05-GP02 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-MW06-GP03**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg					<0.025	0.025	5642746	N/A
Toluene	mg/kg					0.064	0.025	5642746	N/A
Ethylbenzene	mg/kg					0.96	0.025	5642746	0.025
Total Xylenes	mg/kg					8.5	0.050	5642746	N/A
C6 - C10 (less BTEX)	mg/kg					620 (1)	25	5642746	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5642403	N/A	3700	10	5642403	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5642403	N/A	58	10	5642403	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5642403	N/A	<15	15	5642403	N/A
Modified TPH (Tier1)	mg/kg					4400	25	5638081	N/A
Reached Baseline at C32	mg/kg					Yes	N/A	5642403	N/A
Hydrocarbon Resemblance	mg/kg					COMMENT (2)	N/A	5642403	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	88		5642403		83		5642403	
n-Dotriacontane - Extractable	%	79		5642403		94		5642403	
Isobutylbenzene - Volatile	%					75		5642746	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) Weathered fuel oil fraction.

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Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM290	HGM291				HGM292			
Sampling Date		2018/07/09	2018/07/09				2018/07/09			
COC Number		D33434	D33434				D33434			
	UNITS	**2018-MW06-GP05**	**2018-MW08-GP01**	**RDL**	**QC Batch**	**MDL**	**2018-MW18-GP06**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	0.025	5642746	0.010	<0.025	0.025	5654238	0.010
Toluene	mg/kg	<0.025	<0.025	0.025	5642746	0.010	<0.025	0.025	5654238	0.010
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5642746	0.025	<0.025	0.025	5654238	0.010
Total Xylenes	mg/kg	<0.050	<0.050	0.050	5642746	N/A	0.32	0.050	5654238	0.010
Aliphatic >C6-C8	mg/kg						3.1	1.0	5654238	0.020
Aliphatic >C8-C10	mg/kg						270	1.0	5654238	0.080
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	2.5	5642746	N/A				
>C10-C16 Hydrocarbons	mg/kg	<10	<10	10	5642403	N/A				
>C8-C10 Aromatics (-EX)	mg/kg						21	0.50	5654238	0.020
>C16-C21 Hydrocarbons	mg/kg	<10	<10	10	5642403	N/A				
Aliphatic >C10-C12	mg/kg						800	8.0	5642826	1.6
Aliphatic >C12-C16	mg/kg						1200	15	5642826	3.0
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	15	5642403	N/A				
Aliphatic >C16-C21	mg/kg						240	15	5642826	3.0
Aliphatic >C21-<C32	mg/kg						38	15	5642826	3.0
Modified TPH (Tier1)	mg/kg	<15	<15	15	5638081	N/A				
Aromatic >C10-C12	mg/kg						190	4.0	5642826	0.80
Reached Baseline at C32	mg/kg	NA	NA	N/A	5642403	N/A	Yes	N/A	5642826	N/A
Aromatic >C12-C16	mg/kg						360	15	5642826	3.0
Hydrocarbon Resemblance	mg/kg	NA	NA	N/A	5642403	N/A	COMMENT (1)	N/A	5642826	N/A
Aromatic >C16-C21	mg/kg						110	15	5642826	3.0
Aromatic >C21-<C32	mg/kg						32	15	5642826	3.0
Modified TPH (Tier 2)	mg/kg						3300	15	5638082	3.0
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%						94		5642826	
n-Dotriacontane - Extractable	%						94		5642826	
Isobutylbenzene - Extractable	%	86	84		5642403					
n-Dotriacontane - Extractable	%	87	79		5642403					
Isobutylbenzene - Volatile	%						87		5654238	
Isobutylbenzene - Volatile	%	115	107		5642746					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HGM295	HGM296			
Sampling Date		2018/07/09	2018/07/09			
COC Number		D33434	D33434			
	UNITS	**2018-MW50-GP05**	**2018-MW52-GP05**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.025	<0.025	0.025	5642746	0.010
Toluene	mg/kg	<0.025	<0.025	0.025	5642746	0.010
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5642746	0.025
Total Xylenes	mg/kg	0.23	<0.050	0.050	5642746	N/A
C6 - C10 (less BTEX)	mg/kg	230	86	2.5	5642746	N/A
>C10-C16 Hydrocarbons	mg/kg	5800	430	10	5642403	N/A
>C16-C21 Hydrocarbons	mg/kg	850	80	10	5642403	N/A
>C21-<C32 Hydrocarbons	mg/kg	95	<15	15	5642403	N/A
Modified TPH (Tier1)	mg/kg	7000	590	15	5638081	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	N/A	5642403	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (1)	N/A	5642403	N/A
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	81	95		5642403	
n-Dotriacontane - Extractable	%	100	99		5642403	
Isobutylbenzene - Volatile	%	83 (2)	92		5642746	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM191 **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5643978	2018/07/24	2018/07/24	Cassandra Hartery

Maxxam ID: HGM191 Dup **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5643978	2018/07/24	2018/07/24	Cassandra Hartery

Maxxam ID: HGM191 Dup2 **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5643978	2018/07/26	2018/07/26	Cassandra Hartery

Maxxam ID: HGM192 **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/23	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM192 Dup **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley

Maxxam ID: HGM193 **Collected:** 2018/07/09
Sample ID: 2018-MW01-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/25	Automated Statchk
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
PAH Compounds by GCMS (SIM)	GC/MS	5642531	2018/07/23	2018/07/24	Lisa Gates

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM194
Sample ID: 2018-MW01-GP07
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/25	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM195
Sample ID: 2018-MW02-GP01
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/25	Automated Statchk
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
PAH Compounds by GCMS (SIM)	GC/MS	5642531	2018/07/23	2018/07/24	Lisa Gates

Maxxam ID: HGM196
Sample ID: 2018-MW02-GP04
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/25	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/26	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM197
Sample ID: 2018-MW05-GP02
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM197 Dup
Sample ID: 2018-MW05-GP02
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/24	Michelle Shearer

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM198
Sample ID: 2018-MW06-GP01
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/25	Automated Statchk
Metals Solids Acid Extr. ICPMS	ICP/MS	5646198	2018/07/25	2018/07/25	Bryon Angevine
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
PAH Compounds by GCMS (SIM)	GC/MS	5642531	2018/07/23	2018/07/24	Lisa Gates

Maxxam ID: HGM199
Sample ID: 2018-MW06-GP03
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/25	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/26	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM290
Sample ID: 2018-MW06-GP05
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/24	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/23	Shawn Helmkay

Maxxam ID: HGM291
Sample ID: 2018-MW08-GP01
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/24	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/24	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM292
Sample ID: 2018-MW18-GP06
Matrix: Soil

Collected: 2018/07/09
Shipped:
Received: 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (AA PIRI)	GC/FID	5642826	2018/07/23	2018/07/27	Bria Harvey
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T2) Calc. for Soil	CALC	5638082	N/A	2018/08/02	Automated Statchk
VPH in Soil (PIRI2) - Field Preserved	PTGC/MS	5654238	N/A	2018/07/31	Shawn Helmkay

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HGM293 **Collected:** 2018/07/09
Sample ID: 2018-MW50-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5644055	2018/07/24	2018/07/25	Cassandra Hartery

Maxxam ID: HGM294 **Collected:** 2018/07/09
Sample ID: 2018-MW50-GP04 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5636685	N/A	2018/07/25	Automated Statchk
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
PAH Compounds by GCMS (SIM)	GC/MS	5642531	2018/07/23	2018/07/24	Lisa Gates

Maxxam ID: HGM295 **Collected:** 2018/07/09
Sample ID: 2018-MW50-GP05 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/25	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/26	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

Maxxam ID: HGM296 **Collected:** 2018/07/09
Sample ID: 2018-MW52-GP05 **Shipped:**
Matrix: Soil **Received:** 2018/07/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5642403	2018/07/23	2018/07/25	Michelle Shearer
Moisture	BAL	5640321	N/A	2018/07/21	Jacob Henley
ModTPH (T1) Calc. for Soil	CALC	5638081	N/A	2018/07/26	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5642746	N/A	2018/07/24	Shawn Helmkay

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	3.5°C

Results relate only to the items tested.

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642403	Isobutylbenzene - Extractable	2018/07/23	104	60 - 130	93	60 - 130	95	%		
5642403	n-Dotriacontane - Extractable	2018/07/23	75	60 - 130	77	60 - 130	77	%		
5642531	D10-Anthracene	2018/07/24	101	50 - 130	99	50 - 130	103	%		
5642531	D14-Terphenyl (FS)	2018/07/24	92	50 - 130	92	50 - 130	102	%		
5642531	D8-Acenaphthylene	2018/07/24	94	50 - 130	98	50 - 130	100	%		
5642746	Isobutylbenzene - Volatile	2018/07/23	98	60 - 130	92	60 - 130	98	%		
5642826	Isobutylbenzene - Extractable	2018/07/27					94	%		
5642826	n-Dotriacontane - Extractable	2018/07/27					98	%		
5654238	Isobutylbenzene - Volatile	2018/07/30			83	60 - 130	80	%		
5640321	Moisture	2018/07/21							2.2	25
5642403	>C10-C16 Hydrocarbons	2018/07/24	124	30 - 130	112	60 - 130	<10	mg/kg	NC	50
5642403	>C16-C21 Hydrocarbons	2018/07/24	90	30 - 130	91	60 - 130	<10	mg/kg	NC	50
5642403	>C21-<C32 Hydrocarbons	2018/07/24	90	30 - 130	91	60 - 130	<15	mg/kg	NC	50
5642531	1-Methylnaphthalene	2018/07/24	89	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5642531	2-Methylnaphthalene	2018/07/24	95	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5642531	Acenaphthene	2018/07/24	96	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5642531	Acenaphthylene	2018/07/24	109	50 - 130	111	50 - 130	<0.010	mg/kg	NC	50
5642531	Anthracene	2018/07/24	92	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(a)anthracene	2018/07/24	92	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(a)pyrene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(b)fluoranthene	2018/07/24	107	50 - 130	109	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(g,h,i)perylene	2018/07/24	98	50 - 130	101	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(j)fluoranthene	2018/07/24	97	50 - 130	100	50 - 130	<0.010	mg/kg	NC	50
5642531	Benzo(k)fluoranthene	2018/07/24	105	50 - 130	106	50 - 130	<0.010	mg/kg	NC	50
5642531	Chrysene	2018/07/24	89	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5642531	Dibenz(a,h)anthracene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Fluoranthene	2018/07/24	94	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Fluorene	2018/07/24	94	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5642531	Indeno(1,2,3-cd)pyrene	2018/07/24	88	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5642531	Naphthalene	2018/07/24	91	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5642531	Perylene	2018/07/24	94	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5642531	Phenanthrene	2018/07/24	86	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5642531	Pyrene	2018/07/24	97	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5642746	Benzene	2018/07/23	90	60 - 130	88	60 - 140	<0.025	mg/kg	NC	50
5642746	C6 - C10 (less BTEX)	2018/07/23					<2.5	mg/kg	NC	50
5642746	Ethylbenzene	2018/07/23	92	60 - 130	91	60 - 140	<0.025	mg/kg	NC	50
5642746	Toluene	2018/07/23	86	60 - 130	91	60 - 140	<0.025	mg/kg	NC	50
5642746	Total Xylenes	2018/07/23	89	60 - 130	89	60 - 140	<0.050	mg/kg	NC	50
5642826	Aliphatic >C10-C12	2018/07/27			73	60 - 130	<8.0	mg/kg	2.7 (1)	50
5642826	Aliphatic >C12-C16	2018/07/27			96	60 - 130	<15	mg/kg	2.6 (1)	50
5642826	Aliphatic >C16-C21	2018/07/27			100	60 - 130	<15	mg/kg	8.1 (1)	50
5642826	Aliphatic >C21-<C32	2018/07/27			103	60 - 130	<15	mg/kg	12 (1)	50
5642826	Aromatic >C10-C12	2018/07/27			102	60 - 130	<4.0	mg/kg	20	50
5642826	Aromatic >C12-C16	2018/07/27			93	60 - 130	<15	mg/kg	24	50
5642826	Aromatic >C16-C21	2018/07/27			90	60 - 130	<15	mg/kg	24	50
5642826	Aromatic >C21-<C32	2018/07/27			89	60 - 130	<15	mg/kg	1.6	50
5643978	Acid Extractable Aluminum (Al)	2018/07/24					<10	mg/kg	27	35
5643978	Acid Extractable Antimony (Sb)	2018/07/24	103	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Arsenic (As)	2018/07/24	99	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Barium (Ba)	2018/07/24	106	75 - 125	92	75 - 125	<5.0	mg/kg	22	35
5643978	Acid Extractable Beryllium (Be)	2018/07/24	101	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Bismuth (Bi)	2018/07/24	101	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Boron (B)	2018/07/24	102	75 - 125	80	75 - 125	<50	mg/kg	NC	35
5643978	Acid Extractable Cadmium (Cd)	2018/07/24	98	75 - 125	99	75 - 125	<0.30	mg/kg	NC	35
5643978	Acid Extractable Chromium (Cr)	2018/07/24	99	75 - 125	96	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Cobalt (Co)	2018/07/24	96	75 - 125	96	75 - 125	<1.0	mg/kg	NC	35
5643978	Acid Extractable Copper (Cu)	2018/07/24	101	75 - 125	97	75 - 125	<2.0	mg/kg	24	35
5643978	Acid Extractable Iron (Fe)	2018/07/24					<50	mg/kg	33	35
5643978	Acid Extractable Lead (Pb)	2018/07/24	99	75 - 125	98	75 - 125	<0.50	mg/kg	23	35
5643978	Acid Extractable Lithium (Li)	2018/07/24	106	75 - 125	102	75 - 125	<2.0	mg/kg	3.6	35
5643978	Acid Extractable Manganese (Mn)	2018/07/24	NC	75 - 125	99	75 - 125	<2.0	mg/kg	25	35
5643978	Acid Extractable Mercury (Hg)	2018/07/24	94	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5643978	Acid Extractable Molybdenum (Mo)	2018/07/24	99	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Nickel (Ni)	2018/07/24	101	75 - 125	98	75 - 125	<2.0	mg/kg	33	35
5643978	Acid Extractable Rubidium (Rb)	2018/07/24	98	75 - 125	99	75 - 125	<2.0	mg/kg	24	35
5643978	Acid Extractable Selenium (Se)	2018/07/24	100	75 - 125	100	75 - 125	<1.0	mg/kg	NC	35
5643978	Acid Extractable Silver (Ag)	2018/07/24	98	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35
5643978	Acid Extractable Strontium (Sr)	2018/07/24	104	75 - 125	98	75 - 125	<5.0	mg/kg	23	35
5643978	Acid Extractable Thallium (Tl)	2018/07/24	100	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35
5643978	Acid Extractable Tin (Sn)	2018/07/24	109	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5643978	Acid Extractable Uranium (U)	2018/07/24	99	75 - 125	99	75 - 125	<0.10	mg/kg	13	35
5643978	Acid Extractable Vanadium (V)	2018/07/24	105	75 - 125	97	75 - 125	<2.0	mg/kg	47 (2)	35
5643978	Acid Extractable Zinc (Zn)	2018/07/24	107	75 - 125	99	75 - 125	<5.0	mg/kg	15	35
5644055	Acid Extractable Aluminum (Al)	2018/07/25					<10	mg/kg	22	35
5644055	Acid Extractable Antimony (Sb)	2018/07/25	100	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Arsenic (As)	2018/07/25	102	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Barium (Ba)	2018/07/25	90	75 - 125	101	75 - 125	<5.0	mg/kg	16	35
5644055	Acid Extractable Beryllium (Be)	2018/07/25	108	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Bismuth (Bi)	2018/07/25	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Boron (B)	2018/07/25	110	75 - 125	124	75 - 125	<50	mg/kg	NC	35
5644055	Acid Extractable Cadmium (Cd)	2018/07/25	101	75 - 125	102	75 - 125	<0.30	mg/kg	NC	35
5644055	Acid Extractable Chromium (Cr)	2018/07/25	98	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Cobalt (Co)	2018/07/25	101	75 - 125	105	75 - 125	<1.0	mg/kg	13	35
5644055	Acid Extractable Copper (Cu)	2018/07/25	101	75 - 125	104	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Iron (Fe)	2018/07/25					<50	mg/kg	15	35
5644055	Acid Extractable Lead (Pb)	2018/07/25	98	75 - 125	102	75 - 125	<0.50	mg/kg	12	35
5644055	Acid Extractable Lithium (Li)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	8.6	35
5644055	Acid Extractable Manganese (Mn)	2018/07/25	NC	75 - 125	105	75 - 125	<2.0	mg/kg	12	35
5644055	Acid Extractable Mercury (Hg)	2018/07/25	97	75 - 125	105	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Molybdenum (Mo)	2018/07/25	100	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Nickel (Ni)	2018/07/25	103	75 - 125	107	75 - 125	<2.0	mg/kg	22	35
5644055	Acid Extractable Rubidium (Rb)	2018/07/25	98	75 - 125	101	75 - 125	<2.0	mg/kg	17	35
5644055	Acid Extractable Selenium (Se)	2018/07/25	104	75 - 125	107	75 - 125	<1.0	mg/kg	NC	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5644055	Acid Extractable Silver (Ag)	2018/07/25	101	75 - 125	104	75 - 125	<0.50	mg/kg	NC	35
5644055	Acid Extractable Strontium (Sr)	2018/07/25	99	75 - 125	101	75 - 125	<5.0	mg/kg	3.7	35
5644055	Acid Extractable Thallium (Tl)	2018/07/25	101	75 - 125	102	75 - 125	<0.10	mg/kg	NC	35
5644055	Acid Extractable Tin (Sn)	2018/07/25	101	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5644055	Acid Extractable Uranium (U)	2018/07/25	100	75 - 125	102	75 - 125	<0.10	mg/kg	0.19	35
5644055	Acid Extractable Vanadium (V)	2018/07/25	97	75 - 125	105	75 - 125	<2.0	mg/kg	27	35
5644055	Acid Extractable Zinc (Zn)	2018/07/25	89	75 - 125	107	75 - 125	<5.0	mg/kg	15	35
5646198	Acid Extractable Aluminum (Al)	2018/07/25					<10	mg/kg	5.6	35
5646198	Acid Extractable Antimony (Sb)	2018/07/25	96	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Arsenic (As)	2018/07/25	110	75 - 125	100	75 - 125	<2.0	mg/kg	4.7	35
5646198	Acid Extractable Barium (Ba)	2018/07/25	100	75 - 125	98	75 - 125	<5.0	mg/kg	0.22	35
5646198	Acid Extractable Beryllium (Be)	2018/07/25	105	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Bismuth (Bi)	2018/07/25	100	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Boron (B)	2018/07/25	103	75 - 125	109	75 - 125	<50	mg/kg	NC	35
5646198	Acid Extractable Cadmium (Cd)	2018/07/25	101	75 - 125	98	75 - 125	<0.30	mg/kg	NC	35
5646198	Acid Extractable Chromium (Cr)	2018/07/25	107	75 - 125	103	75 - 125	<2.0	mg/kg	6.5	35
5646198	Acid Extractable Cobalt (Co)	2018/07/25	105	75 - 125	103	75 - 125	<1.0	mg/kg	10	35
5646198	Acid Extractable Copper (Cu)	2018/07/25	98	75 - 125	103	75 - 125	<2.0	mg/kg	11	35
5646198	Acid Extractable Iron (Fe)	2018/07/25					<50	mg/kg	5.5	35
5646198	Acid Extractable Lead (Pb)	2018/07/25	100	75 - 125	96	75 - 125	<0.50	mg/kg	25	35
5646198	Acid Extractable Lithium (Li)	2018/07/25	103	75 - 125	98	75 - 125	<2.0	mg/kg	4.2	35
5646198	Acid Extractable Manganese (Mn)	2018/07/25	NC	75 - 125	101	75 - 125	<2.0	mg/kg	4.0	35
5646198	Acid Extractable Mercury (Hg)	2018/07/25	95	75 - 125	103	75 - 125	<0.10	mg/kg	NC	35
5646198	Acid Extractable Molybdenum (Mo)	2018/07/25	101	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35
5646198	Acid Extractable Nickel (Ni)	2018/07/25	105	75 - 125	105	75 - 125	<2.0	mg/kg	6.8	35
5646198	Acid Extractable Rubidium (Rb)	2018/07/25	98	75 - 125	95	75 - 125	<2.0	mg/kg	0.61	35
5646198	Acid Extractable Selenium (Se)	2018/07/25	103	75 - 125	105	75 - 125	<1.0	mg/kg	NC	35
5646198	Acid Extractable Silver (Ag)	2018/07/25	100	75 - 125	100	75 - 125	<0.50	mg/kg	NC	35
5646198	Acid Extractable Strontium (Sr)	2018/07/25	105	75 - 125	96	75 - 125	<5.0	mg/kg	2.7	35
5646198	Acid Extractable Thallium (Tl)	2018/07/25	103	75 - 125	100	75 - 125	<0.10	mg/kg	NC	35
5646198	Acid Extractable Tin (Sn)	2018/07/25	100	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5646198	Acid Extractable Uranium (U)	2018/07/25	99	75 - 125	96	75 - 125	<0.10	mg/kg	11	35
5646198	Acid Extractable Vanadium (V)	2018/07/25	106	75 - 125	102	75 - 125	<2.0	mg/kg	5.3	35
5646198	Acid Extractable Zinc (Zn)	2018/07/25	104	75 - 125	99	75 - 125	<5.0	mg/kg	11	35
5654238	>C8-C10 Aromatics (-EX)	2018/07/30					<0.50	mg/kg		
5654238	Aliphatic >C6-C8	2018/07/30					<1.0	mg/kg		
5654238	Aliphatic >C8-C10	2018/07/30					<1.0	mg/kg		
5654238	Benzene	2018/07/30			89	60 - 140	<0.025	mg/kg		
5654238	Ethylbenzene	2018/07/30			88	60 - 140	<0.025	mg/kg		
5654238	Toluene	2018/07/30			86	60 - 140	<0.025	mg/kg		
5654238	Total Xylenes	2018/07/30			86	60 - 140	<0.050	mg/kg		

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated TEH RDL(s) due to sample dilution.

(2) Poor RPD due to sample inhomogeneity. Results verified by repeat digestion and analysis.

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Maxxam Job #: B8I1829
Report Date: 2018/08/02

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Mike MacGillivray, Scientific Specialist (Inorganics)

Phil Deveau, Scientific Specialist (Organics)

Rosemarie MacDonald, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33433 Page 1 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec Consulting	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St. John's NL Postal Code: A1B0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4.1, 3.0, 3.5	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW01-GP01	2018/07/09		soil	4								X															
2	2018-MW01-GP02																X											
3	2018-MW01-GP03.																				X							
4	2018-MW01-GP07																X											
5	2018-MW02-GP01																				X							
6	2018-MW02-GP04																X											
7	2018-MW05-GP01																											
8	2018-MW05-GP02																X											
9	2018-MW06-GP01												X								X							
10	2018-MW06-GP03	↓		↓	↓												X											

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			[illegible]	2018/07/17	10.00	B8I1829

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CHAIN OF CUSTODY RECORD

COC #: D33434 Page 2 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 5761458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		4.1, 3.0, 3.5	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW06-GP05	2018/07/09		soil	4												X											
2	2018-MW08-GP01	" "											X				X											
3	2018-MW18-GP06	2018/07/10																										TPH Fractionation
4	2018-MW50-GP01												X															
5	2018-MW50-GP04																				X							
6	2018-MW50-GP05																X											
7	2018-MW52-GP05																X											
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
				2018/07/18	0900	B8I1829

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33407, D33408

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/30
Report #: R5326938
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I4514
Received: 2018/07/23, 08:59

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	6	N/A	2018/07/27	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	9	2018/07/26	2018/07/27	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	10	2018/07/26	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Moisture	9	N/A	2018/07/26	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	3	2018/07/26	2018/07/26	ATL SOP 00102	EPA 8270D 2014 m
PAH Compounds by GCMS (SIM) (1)	3	2018/07/26	2018/07/27	ATL SOP 00102	EPA 8270D 2014 m
PCBs in soil by GC/ECD (1)	1	2018/07/25	2018/07/30	ATL SOP 00106	EPA 8082A 2007 m
PCBs in soil by GC/ECD (1)	6	2018/07/26	2018/07/30	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	7	N/A	2018/07/30	N/A	Auto Calc.
ModTPH (T1) Calc. for Soil	9	N/A	2018/07/30	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	9	N/A	2018/07/28	ATL SOP 00119	Atl. RBCA v3.1 m

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	10	N/A	2018/07/27	N/A	SM 22 4500-CO2 D
Alkalinity	8	N/A	2018/07/25	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	2	N/A	2018/07/26	ATL SOP 00013	EPA 310.2 R1974 m
Benzo(b/j)fluoranthene Sum (water)	3	N/A	2018/07/27	N/A	Auto Calc.
Chloride	2	N/A	2018/07/25	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	8	N/A	2018/07/26	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	10	N/A	2018/07/25	ATL SOP 00020	SM 22 2120C m
Conductance - water	10	N/A	2018/07/26	ATL SOP 00004	SM 23 2510B m
TEH in Water (PIRI)	2	2018/07/25	2018/07/27	ATL SOP 00113	Atl. RBCA v3.1 m
TEH in Water (PIRI)	5	2018/07/25	2018/07/28	ATL SOP 00113	Atl. RBCA v3.1 m
TEH in Water (PIRI)	3	2018/07/26	2018/07/27	ATL SOP 00113	Atl. RBCA v3.1 m
Hardness (calculated as CaCO3)	9	N/A	2018/07/26	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2018/07/27	ATL SOP 00048	Auto Calc
Metals Water Total MS	10	2018/07/24	2018/07/26	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference)	10	N/A	2018/07/27	N/A	Auto Calc.

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33407, D33408

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/30
Report #: R5326938
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I4514
Received: 2018/07/23, 08:59

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Anion and Cation Sum	10	N/A	2018/07/27	N/A	Auto Calc.
Nitrogen Ammonia - water	8	N/A	2018/07/25	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	2	N/A	2018/07/26	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	10	N/A	2018/07/26	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	10	N/A	2018/07/26	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	10	N/A	2018/07/27	ATL SOP 00018	ASTM D3867-16
PAH in Water by GC/MS (SIM)	3	2018/07/24	2018/07/26	ATL SOP 00103	EPA 8270D 2014 m
PCBs in water by GC/ECD	3	2018/07/24	2018/07/25	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water)	3	N/A	2018/07/25	N/A	Auto Calc.
pH (3)	10	N/A	2018/07/26	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	10	N/A	2018/07/25	ATL SOP 00021	SM 23 4500-P E m
VPH in Water (PIRI)	10	N/A	2018/07/26	ATL SOP 00118	Atl. RBCA v3.1 m
Sat. pH and Langelier Index (@ 20C)	10	N/A	2018/07/27	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	10	N/A	2018/07/27	ATL SOP 00049	Auto Calc.
Reactive Silica	10	N/A	2018/07/26	ATL SOP 00022	EPA 366.0 m
Sulphate	10	N/A	2018/07/25	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	9	N/A	2018/07/26	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	1	N/A	2018/07/27	N/A	Auto Calc.
Organic carbon - Total (TOC) (4)	9	N/A	2018/07/26	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (4)	1	N/A	2018/07/27	ATL SOP 00203	SM 23 5310B m
ModTPH (T1) Calc. for Water	10	N/A	2018/07/30	N/A	Atl. RBCA v3 m
Turbidity	10	N/A	2018/07/26	ATL SOP 00011	EPA 180.1 R2 m
Volatile Organic Compounds in Water	3	N/A	2018/07/24	ATL SOP 00133	EPA 8260C R3 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33407, D33408

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/07/30
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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8I4514
Received: 2018/07/23, 08:59

indicated otherwise, associated sample data are not blank corrected.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Maxxam
30 Jul 2018 16:29:06

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHB488	HHB489	HHB490	HHB490	HHB491	HHB492			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407	D33407	D33407			
	UNITS	**2018-SED01**	**2018-SED02**	**2018-SED03**	**2018-SED03 Lab-Dup**	**2018-SED04**	**2018-SED05**	**RDL**	**QC Batch**	**MDL**
Inorganics										
Moisture	%	11	26	21	21	16	14	1.0	5646753	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HHB494	HHB495	HHB496	HHB497			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407			
	UNITS	**2018-SED07**	**2018-SED08**	**2018-SED09**	**2018-SED10**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	11	17	15	15	1.0	5646753	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHB488	HHB489	HHB490	HHB491	HHB492	HHB492			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407	D33407	D33407			
	UNITS	**2018-SED01**	**2018-SED02**	**2018-SED03**	**2018-SED04**	**2018-SED05**	**2018-SED05 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	4100	3000	4000	2400	5100	4900	10	5648957	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Barium (Ba)	mg/kg	69	14	23	15	30	33	5.0	5648957	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	<50	50	5648957	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	5648957	N/A
Acid Extractable Chromium (Cr)	mg/kg	4.1	2.7	4.6	<2.0	4.4	4.7	2.0	5648957	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.0	<1.0	1.8	1.3	1.0	1.1	1.0	5648957	N/A
Acid Extractable Copper (Cu)	mg/kg	3.7	<2.0	32	3.0	2.5	2.6	2.0	5648957	N/A
Acid Extractable Iron (Fe)	mg/kg	9100	7400	12000	6400	8700	8600	50	5648957	N/A
Acid Extractable Lead (Pb)	mg/kg	10	4.6	45	4.2	6.5	6.8	0.50	5648957	N/A
Acid Extractable Lithium (Li)	mg/kg	8.2	4.3	7.6	7.0	3.0	3.7	2.0	5648957	N/A
Acid Extractable Manganese (Mn)	mg/kg	90	53	87	57	54	58	2.0	5648957	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5648957	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Nickel (Ni)	mg/kg	2.3	<2.0	3.6	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Rubidium (Rb)	mg/kg	5.7	2.7	4.0	3.0	3.8	4.0	2.0	5648957	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5648957	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5648957	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.0	<5.0	<5.0	<5.0	<5.0	5.2	5.0	5648957	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5648957	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Uranium (U)	mg/kg	0.75	0.32	0.56	0.33	0.39	0.38	0.10	5648957	N/A
Acid Extractable Vanadium (V)	mg/kg	7.9	5.3	11	3.5	8.3	9.7	2.0	5648957	N/A
Acid Extractable Zinc (Zn)	mg/kg	21	10	47	17	12	13	5.0	5648957	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHB493	HHB494	HHB495	HHB496	HHB497			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407	D33407			
	UNITS	**2018-SED06**	**2018-SED07**	**2018-SED08**	**2018-SED09**	**2018-SED10**	**RDL**	**QC Batch**	**MDL**
Metals									
Acid Extractable Aluminum (Al)	mg/kg	3100	3400	3000	3000	3300	10	5648957	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Barium (Ba)	mg/kg	41	52	48	41	58	5.0	5648957	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	50	5648957	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	5648957	N/A
Acid Extractable Chromium (Cr)	mg/kg	8.7	8.1	3.1	3.1	3.2	2.0	5648957	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.7	2.8	2.4	2.1	2.1	1.0	5648957	N/A
Acid Extractable Copper (Cu)	mg/kg	4.1	5.5	4.6	4.8	4.7	2.0	5648957	N/A
Acid Extractable Iron (Fe)	mg/kg	20000	12000	9000	10000	9400	50	5648957	N/A
Acid Extractable Lead (Pb)	mg/kg	6.2	5.1	3.7	4.8	4.1	0.50	5648957	N/A
Acid Extractable Lithium (Li)	mg/kg	9.0	9.5	8.7	8.1	8.1	2.0	5648957	N/A
Acid Extractable Manganese (Mn)	mg/kg	150	130	99	110	110	2.0	5648957	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5648957	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.2	3.4	2.7	2.7	2.7	2.0	5648957	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.1	4.3	5.1	3.4	5.7	2.0	5648957	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5648957	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5648957	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.2	5.5	<5.0	<5.0	5.6	5.0	5648957	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5648957	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5648957	N/A
Acid Extractable Uranium (U)	mg/kg	1.2	0.81	0.48	0.56	0.53	0.10	5648957	N/A
Acid Extractable Vanadium (V)	mg/kg	29	15	6.8	5.3	7.0	2.0	5648957	N/A
Acid Extractable Zinc (Zn)	mg/kg	32	30	23	26	24	5.0	5648957	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHB488		HHB489		HHB490	HHB491	HHB494			
Sampling Date		2018/07/17		2018/07/17		2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407		D33407		D33407	D33407	D33407			
	UNITS	**2018-SED01**	**QC Batch**	**2018-SED02**	**QC Batch**	**2018-SED03**	**2018-SED04**	**2018-SED07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	mg/kg	<0.010	5648754	<0.010	5648960	0.021	<0.010	<0.010	0.010	5648754	N/A
2-Methylnaphthalene	mg/kg	<0.010	5648754	<0.010	5648960	0.024	<0.010	<0.010	0.010	5648754	N/A
Acenaphthene	mg/kg	<0.010	5648754	<0.010	5648960	0.014	<0.010	<0.010	0.010	5648754	N/A
Acenaphthylene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Anthracene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)anthracene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)pyrene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	5642477	<0.020	5642477	<0.020	<0.020	<0.020	0.020	5642477	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Chrysene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Fluoranthene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Fluorene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Naphthalene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Perylene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Phenanthrene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Pyrene	mg/kg	<0.010	5648754	<0.010	5648960	<0.010	<0.010	<0.010	0.010	5648754	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	100	5648754	78	5648960	106	103	101		5648754	
D14-Terphenyl (FS)	%	108	5648754	79	5648960	106	109	101		5648754	
D8-Acenaphthylene	%	98	5648754	94	5648960	102	99	93		5648754	

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N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHB494				HHB496			
Sampling Date		2018/07/17				2018/07/17			
COC Number		D33407				D33407			
	UNITS	**2018-SED07 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SED09**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Acenaphthene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Acenaphthylene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Anthracene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(b/j)fluoranthene	mg/kg					<0.020	0.020	5642477	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Chrysene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Fluoranthene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Fluorene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Naphthalene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Perylene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Phenanthrene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Pyrene	mg/kg	<0.010	0.010	5648754	N/A	<0.010	0.010	5648754	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	89		5648754		100		5648754	
D14-Terphenyl (FS)	%	98		5648754		100		5648754	
D8-Acenaphthylene	%	94		5648754		99		5648754	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHB488				HHB488			
Sampling Date		2018/07/17				2018/07/17			
COC Number		D33407				D33407			
	UNITS	**2018-SED01**	**RDL**	**QC Batch**	**MDL**	**2018-SED01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5651374	N/A	<0.025	0.025	5651374	N/A
Toluene	mg/kg	<0.025	0.025	5651374	N/A	<0.025	0.025	5651374	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5651374	0.025	<0.025	0.025	5651374	0.025
Total Xylenes	mg/kg	<0.050	0.050	5651374	N/A	<0.050	0.050	5651374	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5651374	N/A	<2.5	2.5	5651374	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5648629	N/A				
>C16-C21 Hydrocarbons	mg/kg	<10	10	5648629	N/A				
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5648629	N/A				
Modified TPH (Tier1)	mg/kg	<15	15	5643040	N/A				
Reached Baseline at C32	mg/kg	NA	N/A	5648629	N/A				
Hydrocarbon Resemblance	mg/kg	NA	N/A	5648629	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	94		5648629					
n-Dotriacontane - Extractable	%	115 (1)		5648629					
Isobutylbenzene - Volatile	%	107		5651374		108		5651374	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHB489	HHB490	HHB491	HHB492	HHB494	HHB495			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407	D33407	D33407			
	UNITS	**2018-SED02**	**2018-SED03**	**2018-SED04**	**2018-SED05**	**2018-SED07**	**2018-SED08**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5651374	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5651374	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5651374	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651374	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.5	5651374	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	<10	<10	<10	10	5648629	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	<10	<10	10	5648629	N/A
>C21-<C32 Hydrocarbons	mg/kg	30	55	<15	<15	<15	<15	15	5648629	N/A
Modified TPH (Tier1)	mg/kg	30	55	<15	<15	<15	<15	15	5643040	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	NA	NA	NA	NA	N/A	5648629	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (2)	NA	NA	NA	NA	N/A	5648629	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	96	94	94	94	91	92		5648629	
n-Dotriacontane - Extractable	%	124 (3)	125 (3)	122 (3)	118 (4)	121 (3)	118 (3)		5648629	
Isobutylbenzene - Volatile	%	127 (5)	119	107	118 (5)	114 (5)	116		5651374	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range.
(2) Possible lube oil fraction.
(3) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(4) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHB496	HHB497			
Sampling Date		2018/07/17	2018/07/17			
COC Number		D33407	D33407			
	UNITS	**2018-SED09**	**2018-SED10**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.025	<0.025	0.025	5651374	N/A
Toluene	mg/kg	<0.025	<0.025	0.025	5651374	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5651374	0.025
Total Xylenes	mg/kg	<0.050	<0.050	0.050	5651374	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	2.5	5651374	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	10	5648629	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	10	5648629	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	15	5648629	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	15	5643040	N/A
Reached Baseline at C32	mg/kg	NA	NA	N/A	5648629	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	N/A	5648629	N/A
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	93	93		5648629	
n-Dotriacontane - Extractable	%	121 (1)	118 (1)		5648629	
Isobutylbenzene - Volatile	%	103	117 (2)		5651374	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Site Location: BORDER BEACON
Sampler Initials: RP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HHB488	HHB489	HHB490	HHB491	HHB492	HHB495			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33407	D33407	D33407	D33407	D33407	D33407			
	UNITS	**2018-SED01**	**2018-SED02**	**2018-SED03**	**2018-SED04**	**2018-SED05**	**2018-SED08**	**RDL**	**QC Batch**	**MDL**
PCBs										
Aroclor 1016	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1221	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1232	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1248	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1242	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1254	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1260	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5649293	N/A
Calculated Total PCB	ug/g	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5642478	N/A
Surrogate Recovery (%)										
Decachlorobiphenyl	%	91	94	94	90	92	92		5649293	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		HHB497			
Sampling Date		2018/07/17			
COC Number		D33407			
	UNITS	**2018-SED10**	**RDL**	**QC Batch**	**MDL**
PCBs					
Aroclor 1016	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1221	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1232	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1248	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1242	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1254	ug/g	<0.050	0.050	5649293	N/A
Aroclor 1260	ug/g	<0.050	0.050	5649293	N/A
Calculated Total PCB	ug/g	<0.050	0.050	5642478	N/A
Surrogate Recovery (%)					
Decachlorobiphenyl	%	91		5649293	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHB685		HHB686		HHB687		HHB688			
Sampling Date		2018/07/17		2018/07/17		2018/07/17		2018/07/17			
COC Number		D33408		D33408		D33408		D33408			
	UNITS	**2018-SW01**	**QC Batch**	**2018-SW02**	**QC Batch**	**2018-SW03**	**QC Batch**	**2018-SW04**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters											
Anion Sum	me/L	0.190	5642189	0.00	5642189	0.00	5642189	0.0300	N/A	5642189	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	9.3	5642186	<1.0	5642186	<1.0	5642186	<1.0	1.0	5642186	0.20
Calculated TDS	mg/L	14	5642194	<1.0	5642194	<1.0	5642194	1.0	1.0	5642194	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5642186	<1.0	5642186	<1.0	5642186	<1.0	1.0	5642186	0.20
Cation Sum	me/L	0.220	5642189	0.0200	5642189	0.0100	5642189	0.0100	N/A	5642189	N/A
Hardness (CaCO3)	mg/L	8.5	5642187	<1.0	5642187	<1.0	5642187	<1.0	1.0	5642187	1.0
Ion Balance (% Difference)	%	7.32	5642188	100	5642188	100	5642188	50.0	N/A	5642188	N/A
Langelier Index (@ 20C)	N/A	-2.86	5642192	NC	5642192	NC	5642192	NC		5642192	
Langelier Index (@ 4C)	N/A	-3.11	5642193	NC	5642193	NC	5642193	NC		5642193	
Nitrate (N)	mg/L	<0.050	5642190	<0.050	5642190	<0.050	5642190	<0.050	0.050	5642190	N/A
Saturation pH (@ 20C)	N/A	9.86	5642192	NC	5642192	NC	5642192	NC		5642192	
Saturation pH (@ 4C)	N/A	10.1	5642193	NC	5642193	NC	5642193	NC		5642193	
Inorganics											
Total Alkalinity (Total as CaCO3)	mg/L	9.3	5646498	<5.0	5646498	<5.0	5646498	<5.0	5.0	5646498	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	5646506	<1.0	5646506	<1.0	5646506	1.0	1.0	5646506	N/A
Colour	TCU	7.1	5646519	9.2	5646519	<5.0	5646519	<5.0	5.0	5646519	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	5646522	<0.050	5646522	<0.050	5646522	<0.050	0.050	5646522	N/A
Nitrite (N)	mg/L	<0.010	5646524	<0.010	5646524	<0.010	5646524	<0.010	0.010	5646524	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	5645176	0.060	5646804	<0.050	5646804	<0.050	0.050	5645176	N/A
Total Organic Carbon (C)	mg/L	1.5	5648874	3.6	5648874	0.51	5648874	<0.50	0.50	5648874	N/A
Orthophosphate (P)	mg/L	<0.010	5646520	<0.010	5646520	<0.010	5646520	<0.010	0.010	5646520	N/A
pH	pH	7.01	5648693	6.22	5648693	6.06	5648711	6.20	N/A	5648711	N/A
Reactive Silica (SiO2)	mg/L	3.5	5646513	<0.50	5646513	<0.50	5646513	<0.50	0.50	5646513	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	5646507	<2.0	5646507	<2.0	5646507	<2.0	2.0	5646507	N/A
Turbidity	NTU	0.28	5648634	0.45	5648634	0.29	5648634	0.19	0.10	5648634	0.10
Conductivity	uS/cm	23	5648700	3.4	5648700	2.3	5648715	1.5	1.0	5648715	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHB689			HHB690		HHB691			
Sampling Date		2018/07/17			2018/07/17		2018/07/17			
COC Number		D33408			D33408		D33408			
	UNITS	**2018-SW05**	**RDL**	**QC Batch**	**2018-SW06**	**QC Batch**	**2018-SW07**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters										
Anion Sum	me/L	0.170	N/A	5642189	0.240	5642189	0.190	N/A	5642189	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	6.0	1.0	5642186	9.8	5642186	7.6	1.0	5642186	0.20
Calculated TDS	mg/L	8.0	1.0	5642194	15	5642194	13	1.0	5642194	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5642186	<1.0	5642186	<1.0	1.0	5642186	0.20
Cation Sum	me/L	0.0200	N/A	5642189	0.210	5642189	0.170	N/A	5642189	N/A
Hardness (CaCO3)	mg/L	<1.0	1.0	5642187	8.1	5642187	6.2	1.0	5642187	1.0
Ion Balance (% Difference)	%	79.0	N/A	5642188	6.67	5642188	5.56	N/A	5642188	N/A
Langelier Index (@ 20C)	N/A	-5.08		5642192	-2.17	5642192	-3.07		5642192	
Langelier Index (@ 4C)	N/A	-5.34		5642193	-2.42	5642193	-3.32		5642193	
Nitrate (N)	mg/L	0.066	0.050	5642190	<0.050	5642190	<0.050	0.050	5642190	N/A
Saturation pH (@ 20C)	N/A	11.3		5642192	9.86	5642192	10.1		5642192	
Saturation pH (@ 4C)	N/A	11.6		5642193	10.1	5642193	10.3		5642193	
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	6.0	5.0	5646498	9.9	5646498	7.6	5.0	5646498	N/A
Dissolved Chloride (Cl-)	mg/L	1.4	1.0	5646506	1.5	5646506	1.4	1.0	5646506	N/A
Colour	TCU	21	5.0	5646519	6.1	5646519	13	5.0	5646519	N/A
Nitrate + Nitrite (N)	mg/L	0.066	0.050	5646522	<0.050	5646522	<0.050	0.050	5646522	N/A
Nitrite (N)	mg/L	<0.010	0.010	5646524	<0.010	5646524	<0.010	0.010	5646524	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	0.095	0.050	5646813	<0.050	5645176	<0.050	0.050	5646808	N/A
Total Organic Carbon (C)	mg/L	80 (1)	50	5647278	1.4	5648874	2.1	0.50	5648876	N/A
Orthophosphate (P)	mg/L	0.012	0.010	5646520	<0.010	5646520	<0.010	0.010	5646520	N/A
pH	pH	6.22	N/A	5648693	7.69	5648693	7.03	N/A	5648711	N/A
Reactive Silica (SiO2)	mg/L	1.8	0.50	5646513	3.4	5646513	3.2	0.50	5646513	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	5646507	<2.0	5646507	<2.0	2.0	5646507	N/A
Turbidity	NTU	560	1.0	5648640	0.21	5648634	0.35	0.10	5648634	0.10
Conductivity	uS/cm	14	1.0	5648700	25	5648700	17	1.0	5648715	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHB692		HHB693		HHB694			
Sampling Date		2018/07/17		2018/07/17		2018/07/17			
COC Number		D33408		D33408		D33408			
	UNITS	**2018-SW08**	**QC Batch**	**2018-SW09**	**QC Batch**	**2018-SW10**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters									
Anion Sum	me/L	0.200	5642189	0.220	5642189	0.210	N/A	5642189	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	7.9	5642186	8.7	5642186	8.5	1.0	5642186	0.20
Calculated TDS	mg/L	13	5642194	13	5642194	13	1.0	5642194	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5642186	<1.0	5642186	<1.0	1.0	5642186	0.20
Cation Sum	me/L	0.180	5642189	0.160	5642189	0.160	N/A	5642189	N/A
Hardness (CaCO3)	mg/L	6.7	5642187	5.9	5642187	6.1	1.0	5642187	1.0
Ion Balance (% Difference)	%	5.26	5642188	15.8	5642188	13.5	N/A	5642188	N/A
Langelier Index (@ 20C)	N/A	-3.22	5642192	-3.17	5642192	-3.09		5642192	
Langelier Index (@ 4C)	N/A	-3.47	5642193	-3.42	5642193	-3.34		5642193	
Nitrate (N)	mg/L	<0.050	5642190	<0.050	5642190	<0.050	0.050	5642190	N/A
Saturation pH (@ 20C)	N/A	10.1	5642192	10.1	5642192	10.1		5642192	
Saturation pH (@ 4C)	N/A	10.3	5642193	10.3	5642193	10.3		5642193	
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	7.9	5646498	8.8	5646498	8.6	5.0	5646498	N/A
Dissolved Chloride (Cl-)	mg/L	1.6	5646506	1.5	5646506	1.5	1.0	5646506	N/A
Colour	TCU	12	5646519	11	5646519	12	5.0	5646519	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	5646522	<0.050	5646522	<0.050	0.050	5646522	N/A
Nitrite (N)	mg/L	<0.010	5646524	<0.010	5646524	<0.010	0.010	5646524	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	5646808	<0.050	5646808	<0.050	0.050	5646808	N/A
Total Organic Carbon (C)	mg/L	2.1	5648874	2.1	5648874	2.2	0.50	5648874	N/A
Orthophosphate (P)	mg/L	<0.010	5646520	<0.010	5646520	<0.010	0.010	5646520	N/A
pH	pH	6.84	5648711	6.89	5648693	6.97	N/A	5648711	N/A
Reactive Silica (SiO2)	mg/L	3.2	5646513	3.2	5646513	3.2	0.50	5646513	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	5646507	<2.0	5646507	<2.0	2.0	5646507	N/A
Turbidity	NTU	0.13	5648634	0.29	5648640	0.59	0.10	5648634	0.10
Conductivity	uS/cm	16	5648715	16	5648700	17	1.0	5648715	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I4514
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Site Location: BORDER BEACON
Sampler Initials: RP

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHB685	HHB686	HHB687	HHB688	HHB689	HHB690			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408	D33408	D33408	D33408			
	UNITS	**2018-SW01**	**2018-SW02**	**2018-SW03**	**2018-SW04**	**2018-SW05**	**2018-SW06**	**RDL**	**QC Batch**	**MDL**
Metals										
Total Aluminum (Al)	ug/L	36	150	21	74	17	51	5.0	5644308	N/A
Total Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Barium (Ba)	ug/L	36	5.7	1.2	<1.0	1.3	32	1.0	5644308	N/A
Total Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Boron (B)	ug/L	<50	<50	<50	<50	<50	<50	50	5644308	N/A
Total Cadmium (Cd)	ug/L	<0.010	<0.010	0.12	<0.010	0.12	0.038	0.010	5644308	N/A
Total Calcium (Ca)	ug/L	2700	160	170	110	150	2600	100	5644308	N/A
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Cobalt (Co)	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	5644308	N/A
Total Copper (Cu)	ug/L	<2.0	<2.0	4.5	<2.0	3.3	<2.0	2.0	5644308	N/A
Total Iron (Fe)	ug/L	65	140	140	71	140	78	50	5644308	N/A
Total Lead (Pb)	ug/L	<0.50	0.97	1.7	0.56	1.6	<0.50	0.50	5644308	N/A
Total Magnesium (Mg)	ug/L	390	<100	<100	<100	<100	380	100	5644308	N/A
Total Manganese (Mn)	ug/L	6.8	3.1	8.4	3.4	9.0	7.6	2.0	5644308	N/A
Total Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Phosphorus (P)	ug/L	<100	<100	<100	<100	<100	<100	100	5644308	N/A
Total Potassium (K)	ug/L	390	<100	<100	<100	<100	380	100	5644308	N/A
Total Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Sodium (Na)	ug/L	850	<100	<100	<100	<100	700	100	5644308	N/A
Total Strontium (Sr)	ug/L	16	<2.0	<2.0	<2.0	<2.0	15	2.0	5644308	N/A
Total Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Titanium (Ti)	ug/L	<2.0	6.2	<2.0	<2.0	<2.0	2.5	2.0	5644308	N/A
Total Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Zinc (Zn)	ug/L	<5.0	17	9.2	<5.0	9.2	<5.0	5.0	5644308	N/A

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHB691	HHB692	HHB693	HHB694			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408	D33408			
	UNITS	**2018-SW07**	**2018-SW08**	**2018-SW09**	**2018-SW10**	**RDL**	**QC Batch**	**MDL**
Metals								
Total Aluminum (Al)	ug/L	150	190	45	74	5.0	5644308	N/A
Total Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Barium (Ba)	ug/L	16	17	14	18	1.0	5644308	N/A
Total Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Boron (B)	ug/L	<50	<50	<50	<50	50	5644308	N/A
Total Cadmium (Cd)	ug/L	0.018	0.018	<0.010	0.035	0.010	5644308	N/A
Total Calcium (Ca)	ug/L	1900	2100	1900	1900	100	5644308	N/A
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Cobalt (Co)	ug/L	<0.40	<0.40	<0.40	<0.40	0.40	5644308	N/A
Total Copper (Cu)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Iron (Fe)	ug/L	280	380	110	160	50	5644308	N/A
Total Lead (Pb)	ug/L	<0.50	0.61	<0.50	<0.50	0.50	5644308	N/A
Total Magnesium (Mg)	ug/L	330	380	290	310	100	5644308	N/A
Total Manganese (Mn)	ug/L	11	12	7.7	8.6	2.0	5644308	N/A
Total Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Phosphorus (P)	ug/L	<100	<100	<100	<100	100	5644308	N/A
Total Potassium (K)	ug/L	320	320	290	280	100	5644308	N/A
Total Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644308	N/A
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Sodium (Na)	ug/L	640	670	630	640	100	5644308	N/A
Total Strontium (Sr)	ug/L	11	12	12	11	2.0	5644308	N/A
Total Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Titanium (Ti)	ug/L	9.1	13	<2.0	2.7	2.0	5644308	N/A
Total Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	5644308	N/A
Total Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644308	N/A
Total Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	5.0	5644308	N/A

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHB685	HHB686	HHB689			
Sampling Date		2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408			
	UNITS	**2018-SW01**	**2018-SW02**	**2018-SW05**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	0.050	5645293	N/A
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	0.050	5645293	N/A
Acenaphthene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Acenaphthylene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Anthracene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(b/j)fluoranthene	ug/L	<0.020	<0.020	<0.020	0.020	5643031	N/A
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Chrysene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Fluoranthene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Fluorene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Naphthalene	ug/L	<0.20	<0.20	<0.20	0.20	5645293	N/A
Perylene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Phenanthrene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Pyrene	ug/L	<0.010	<0.010	<0.010	0.010	5645293	N/A
Surrogate Recovery (%)							
D10-Anthracene	%	81	78	64		5645293	
D14-Terphenyl	%	87	83	65 (1)		5645293	
D8-Acenaphthylene	%	79	77	68		5645293	

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(1) PAH sample contained sediment.

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VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		HHB685	HHB685	HHB686	HHB689			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408	D33408			
	UNITS	**2018-SW01**	**2018-SW01 Lab-Dup**	**2018-SW02**	**2018-SW05**	**RDL**	**QC Batch**	**MDL**
Chlorobenzenes								
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
1,3-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
1,4-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Volatile Organics								
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
1,1-Dichloroethane	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644700	N/A
1,1-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	1.0
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
1,2-Dichloropropane	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	0.20
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	0.20
Bromomethane	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
Carbon Tetrachloride	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
Chloroethane	ug/L	<8.0	<8.0	<8.0	<8.0	8.0	5644700	N/A
Chloroform	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	0.20
Chloromethane	ug/L	<8.0	<8.0	<8.0	<8.0	8.0	5644700	N/A
cis-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
cis-1,3-Dichloropropene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	0.20
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	<0.20	0.20	5644700	0.50
Methyl t-butyl ether (MTBE)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644700	N/A
Methylene Chloride(Dichloromethane)	ug/L	<3.0	<3.0	<3.0	<3.0	3.0	5644700	N/A
o-Xylene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
p+m-Xylene	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	5644700	N/A
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Tetrachloroethylene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Total Trihalomethanes	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A

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VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		HHB685	HHB685	HHB686	HHB689			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408	D33408			
	UNITS	**2018-SW01**	**2018-SW01 Lab-Dup**	**2018-SW02**	**2018-SW05**	**RDL**	**QC Batch**	**MDL**
Total Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	1.0
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
trans-1,3-Dichloropropene	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	N/A
Trichloroethylene	ug/L	<1.0	<1.0	<1.0	<1.0	1.0	5644700	N/A
Trichlorofluoromethane (FREON 11)	ug/L	<8.0	<8.0	<8.0	<8.0	8.0	5644700	N/A
Vinyl Chloride	ug/L	<0.50	<0.50	<0.50	<0.50	0.50	5644700	2.0
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	100	99	99	99		5644700	
D4-1,2-Dichloroethane	%	98	99	98	104		5644700	
D8-Toluene	%	101	101	101	100		5644700	

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHB685	HHB686		HHB687			
Sampling Date		2018/07/17	2018/07/17		2018/07/17			
COC Number		D33408	D33408		D33408			
	UNITS	**2018-SW01**	**2018-SW02**	**QC Batch**	**2018-SW03**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/L	<0.0010	<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Toluene	mg/L	<0.0010	<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Ethylbenzene	mg/L	<0.0010	<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Total Xylenes	mg/L	<0.0020	<0.0020	5646434	<0.0020	0.0020	5646434	N/A
C6 - C10 (less BTEX)	mg/L	<0.010	<0.010	5646434	<0.010	0.010	5646434	N/A
>C10-C16 Hydrocarbons	mg/L	<0.050	<0.050	5646698	<0.050	0.050	5646701	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	<0.050	5646698	<0.050	0.050	5646701	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	<0.10	5646698	<0.10	0.10	5646701	N/A
Modified TPH (Tier1)	mg/L	<0.10	<0.10	5642289	<0.10	0.10	5642289	N/A
Reached Baseline at C32	mg/L	NA	NA	5646698	NA	N/A	5646701	N/A
Hydrocarbon Resemblance	mg/L	NA	NA	5646698	NA	N/A	5646701	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	92	95	5646698	109		5646701	
n-Dotriacontane - Extractable	%	103	110	5646698	102		5646701	
Isobutylbenzene - Volatile	%	102	102	5646434	94		5646434	

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Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHB687				HHB688		HHB689			
Sampling Date		2018/07/17				2018/07/17		2018/07/17			
COC Number		D33408				D33408		D33408			
	UNITS	**2018-SW03 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SW04**	**QC Batch**	**2018-SW05**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons											
Benzene	mg/L					<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Toluene	mg/L					<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Ethylbenzene	mg/L					<0.0010	5646434	<0.0010	0.0010	5646434	N/A
Total Xylenes	mg/L					<0.0020	5646434	<0.0020	0.0020	5646434	N/A
C6 - C10 (less BTEX)	mg/L					<0.010	5646434	<0.010	0.010	5646434	N/A
>C10-C16 Hydrocarbons	mg/L	<0.050	0.050	5646701	N/A	<0.050	5646701	<0.050	0.050	5648878	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	0.050	5646701	N/A	<0.050	5646701	<0.050	0.050	5648878	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	5646701	N/A	<0.10	5646701	<0.10	0.10	5648878	N/A
Modified TPH (Tier1)	mg/L					<0.10	5642289	<0.10	0.10	5642289	N/A
Reached Baseline at C32	mg/L					NA	5646701	NA	N/A	5648878	N/A
Hydrocarbon Resemblance	mg/L					NA	5646701	NA	N/A	5648878	N/A
Surrogate Recovery (%)											
Isobutylbenzene - Extractable	%	107		5646701		101	5646701	111		5648878	
n-Dotriacontane - Extractable	%	99		5646701		94	5646701	107 (1)		5648878	
Isobutylbenzene - Volatile	%					95	5646434	96		5646434	

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

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHB690				HHB690			
Sampling Date		2018/07/17				2018/07/17			
COC Number		D33408				D33408			
	UNITS	**2018-SW06**	**RDL**	**QC Batch**	**MDL**	**2018-SW06 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	0.0010	5646434	N/A				
Toluene	mg/L	<0.0010	0.0010	5646434	N/A				
Ethylbenzene	mg/L	<0.0010	0.0010	5646434	N/A				
Total Xylenes	mg/L	<0.0020	0.0020	5646434	N/A				
C6 - C10 (less BTEX)	mg/L	<0.010	0.010	5646434	N/A				
>C10-C16 Hydrocarbons	mg/L	<0.050	0.050	5648878	N/A	<0.050	0.050	5648878	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	0.050	5648878	N/A	<0.050	0.050	5648878	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	5648878	N/A	<0.10	0.10	5648878	N/A
Modified TPH (Tier1)	mg/L	<0.10	0.10	5643042	N/A				
Reached Baseline at C32	mg/L	NA	N/A	5648878	N/A				
Hydrocarbon Resemblance	mg/L	NA	N/A	5648878	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	109		5648878		97		5648878	
n-Dotriacontane - Extractable	%	98		5648878		88		5648878	
Isobutylbenzene - Volatile	%	102		5646434					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Site Location: BORDER BEACON
Sampler Initials: RP

ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHB691		HHB692	HHB693	HHB694			
Sampling Date		2018/07/17		2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408		D33408	D33408	D33408			
	UNITS	**2018-SW07**	**QC Batch**	**2018-SW08**	**2018-SW09**	**2018-SW10**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	5646434	<0.0010	<0.0010	<0.0010	0.0010	5646434	N/A
Toluene	mg/L	<0.0010	5646434	<0.0010	<0.0010	<0.0010	0.0010	5646434	N/A
Ethylbenzene	mg/L	<0.0010	5646434	<0.0010	<0.0010	<0.0010	0.0010	5646434	N/A
Total Xylenes	mg/L	<0.0020	5646434	<0.0020	<0.0020	<0.0020	0.0020	5646434	N/A
C6 - C10 (less BTEX)	mg/L	<0.010	5646434	<0.010	<0.010	<0.010	0.010	5646434	N/A
>C10-C16 Hydrocarbons	mg/L	<0.050	5648878	<0.050	<0.050	<0.050	0.050	5646701	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	5648878	<0.050	<0.050	<0.050	0.050	5646701	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	5648878	<0.10	<0.10	<0.10	0.10	5646701	N/A
Modified TPH (Tier1)	mg/L	<0.10	5643042	<0.10	<0.10	<0.10	0.10	5643042	N/A
Reached Baseline at C32	mg/L	NA	5648878	NA	NA	NA	N/A	5646701	N/A
Hydrocarbon Resemblance	mg/L	NA	5648878	NA	NA	NA	N/A	5646701	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	101	5648878	109	107	92		5646701	
n-Dotriacontane - Extractable	%	93	5648878	100	97	83		5646701	
Isobutylbenzene - Volatile	%	101	5646434	101	101	102		5646434	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HHB685	HHB686	HHB689			
Sampling Date		2018/07/17	2018/07/17	2018/07/17			
COC Number		D33408	D33408	D33408			
	UNITS	**2018-SW01**	**2018-SW02**	**2018-SW05**	**RDL**	**QC Batch**	**MDL**
PCBs							
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	0.050	5644116	N/A
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	0.050	5643037	N/A
Surrogate Recovery (%)							
Decachlorobiphenyl	%	71	58	30		5644116	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB488
Sample ID: 2018-SED01
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/26	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB488 Dup
Sample ID: 2018-SED01
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB489
Sample ID: 2018-SED02
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/07/27	Lisa Gates
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB490
Sample ID: 2018-SED03
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/26	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB490 **Collected:** 2018/07/17
Sample ID: 2018-SED03 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB490 Dup **Collected:** 2018/07/17
Sample ID: 2018-SED03 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar

Maxxam ID: HHB491 **Collected:** 2018/07/17
Sample ID: 2018-SED04 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB492 **Collected:** 2018/07/17
Sample ID: 2018-SED05 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/25	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB492 Dup **Collected:** 2018/07/17
Sample ID: 2018-SED05 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery

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TEST SUMMARY

Maxxam ID: HHB493 **Collected:** 2018/07/17
Sample ID: 2018-SED06 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery

Maxxam ID: HHB494 **Collected:** 2018/07/17
Sample ID: 2018-SED07 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/26	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB494 Dup **Collected:** 2018/07/17
Sample ID: 2018-SED07 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/26	Kelly Gale

Maxxam ID: HHB495 **Collected:** 2018/07/17
Sample ID: 2018-SED08 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB496 **Collected:** 2018/07/17
Sample ID: 2018-SED09 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5642477	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale

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TEST SUMMARY

Maxxam ID: HHB496
Sample ID: 2018-SED09
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB497
Sample ID: 2018-SED10
Matrix: Soil

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648629	2018/07/26	2018/07/27	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5648957	2018/07/26	2018/07/27	Cassandra Hartery
Moisture	BAL	5646753	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5642478	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5643040	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHB685
Sample ID: 2018-SW01
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/26	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5643031	N/A	2018/07/27	Automated Statchk
Chloride	KONE	5646506	N/A	2018/07/25	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648700	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646698	2018/07/25	2018/07/27	Michelle Shearer
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5645176	N/A	2018/07/25	Nancy Rogers
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5645293	2018/07/24	2018/07/26	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5644116	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (water)	CALC	5643037	N/A	2018/07/25	Automated Statchk
pH	AT	5648693	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB685
Sample ID: 2018-SW01
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5642289	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith
Volatile Organic Compounds in Water	HS/MS	5644700	N/A	2018/07/24	Amanda Swales

Maxxam ID: HHB685 Dup
Sample ID: 2018-SW01
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds in Water	HS/MS	5644700	N/A	2018/07/24	Amanda Swales

Maxxam ID: HHB686
Sample ID: 2018-SW02
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/26	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5643031	N/A	2018/07/27	Automated Statchk
Chloride	KONE	5646506	N/A	2018/07/25	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648700	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646698	2018/07/25	2018/07/27	Michelle Shearer
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646804	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5645293	2018/07/24	2018/07/26	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5644116	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (water)	CALC	5643037	N/A	2018/07/25	Automated Statchk
pH	AT	5648693	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB686
Sample ID: 2018-SW02
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5642289	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith
Volatile Organic Compounds in Water	HS/MS	5644700	N/A	2018/07/24	Amanda Swales

Maxxam ID: HHB687
Sample ID: 2018-SW03
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648715	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646804	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648711	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5642289	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

Maxxam ID: HHB687 Dup
Sample ID: 2018-SW03
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB688
Sample ID: 2018-SW04
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648715	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5645176	N/A	2018/07/25	Nancy Rogers
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648711	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5642289	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

Maxxam ID: HHB689
Sample ID: 2018-SW05
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5643031	N/A	2018/07/27	Automated Statchk
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648700	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5648878	2018/07/26	2018/07/27	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646813	N/A	2018/07/25	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB689
Sample ID: 2018-SW05
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5645293	2018/07/24	2018/07/26	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5644116	2018/07/24	2018/07/25	Chloe Bramble
PCB Aroclor sum (water)	CALC	5643037	N/A	2018/07/25	Automated Statchk
pH	AT	5648693	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5647278	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5642289	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648640	N/A	2018/07/26	Steven Smith
Volatile Organic Compounds in Water	HS/MS	5644700	N/A	2018/07/24	Amanda Swales

Maxxam ID: HHB690
Sample ID: 2018-SW06
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648700	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5648878	2018/07/26	2018/07/27	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5645176	N/A	2018/07/25	Nancy Rogers
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648693	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB690
Sample ID: 2018-SW06
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5643042	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

Maxxam ID: HHB690 Dup
Sample ID: 2018-SW06
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Water (PIRI)	GC/FID	5648878	2018/07/26	2018/07/27	Marley Gidney

Maxxam ID: HHB691
Sample ID: 2018-SW07
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648715	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5648878	2018/07/26	2018/07/27	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646808	N/A	2018/07/25	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648711	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648876	N/A	2018/07/27	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5643042	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB692
Sample ID: 2018-SW08
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648715	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/27	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646808	N/A	2018/07/25	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648711	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/27	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5643042	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

Maxxam ID: HHB693
Sample ID: 2018-SW09
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648700	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646808	N/A	2018/07/25	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

TEST SUMMARY

Maxxam ID: HHB693
Sample ID: 2018-SW09
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648693	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5643042	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648640	N/A	2018/07/26	Steven Smith

Maxxam ID: HHB694
Sample ID: 2018-SW10
Matrix: Water

Collected: 2018/07/17
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5642186	N/A	2018/07/27	Automated Statchk
Alkalinity	KONE	5646498	N/A	2018/07/25	Mary Clancey
Chloride	KONE	5646506	N/A	2018/07/26	Mary Clancey
Colour	KONE	5646519	N/A	2018/07/25	Mary Clancey
Conductance - water	AT	5648715	N/A	2018/07/26	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5646701	2018/07/25	2018/07/28	Marley Gidney
Hardness (calculated as CaCO3)		5642187	N/A	2018/07/26	Automated Statchk
Metals Water Total MS	CICP/MS	5644308	2018/07/24	2018/07/26	Cassandra Hartery
Ion Balance (% Difference)	CALC	5642188	N/A	2018/07/27	Automated Statchk
Anion and Cation Sum	CALC	5642189	N/A	2018/07/27	Automated Statchk
Nitrogen Ammonia - water	KONE	5646808	N/A	2018/07/25	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5646522	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrite	KONE	5646524	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5642190	N/A	2018/07/27	Automated Statchk
pH	AT	5648711	N/A	2018/07/26	Nicholas Hutchinson
Phosphorus - ortho	KONE	5646520	N/A	2018/07/25	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5646434	N/A	2018/07/26	Thea Holland
Sat. pH and Langelier Index (@ 20C)	CALC	5642192	N/A	2018/07/27	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5642193	N/A	2018/07/27	Automated Statchk
Reactive Silica	KONE	5646513	N/A	2018/07/26	Mary Clancey
Sulphate	KONE	5646507	N/A	2018/07/25	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5642194	N/A	2018/07/26	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5648874	N/A	2018/07/26	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5643042	N/A	2018/07/30	Automated Statchk
Turbidity	TURB	5648634	N/A	2018/07/26	Steven Smith

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

GENERAL COMMENTS

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

Package 1	10.4°C

Sample received above 10°C.

Sample HHB685 [2018-SW01] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB686 [2018-SW02] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB687 [2018-SW03] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB688 [2018-SW04] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB689 [2018-SW05] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB690 [2018-SW06] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB691 [2018-SW07] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB692 [2018-SW08] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB693 [2018-SW09] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHB694 [2018-SW10] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5644116	Decachlorobiphenyl	2018/07/25	42	30 - 130	91	30 - 130	66	%				
5644700	4-Bromofluorobenzene	2018/07/24	101	70 - 130	101	70 - 130	100	%				
5644700	D4-1,2-Dichloroethane	2018/07/24	102	70 - 130	98	70 - 130	97	%				
5644700	D8-Toluene	2018/07/24	98	70 - 130	99	70 - 130	101	%				
5645293	D10-Anthracene	2018/07/26	84	50 - 130	86	50 - 130	86	%				
5645293	D14-Terphenyl	2018/07/26	91	50 - 130	94	50 - 130	92	%				
5645293	D8-Acenaphthylene	2018/07/26	82	50 - 130	82	50 - 130	81	%				
5646434	Isobutylbenzene - Volatile	2018/07/26	99	70 - 130	99	70 - 130	102	%				
5646698	Isobutylbenzene - Extractable	2018/07/27	95	70 - 130	89	70 - 130	87	%				
5646698	n-Dotriacontane - Extractable	2018/07/27	114	70 - 130	108	70 - 130	110	%				
5646701	Isobutylbenzene - Extractable	2018/07/28	107	70 - 130	95	70 - 130	93	%				
5646701	n-Dotriacontane - Extractable	2018/07/28	109	70 - 130	100	70 - 130	86	%				
5648629	Isobutylbenzene - Extractable	2018/07/27	94	60 - 130	95	60 - 130	91	%				
5648629	n-Dotriacontane - Extractable	2018/07/27	118	60 - 130	112	60 - 130	110	%				
5648754	D10-Anthracene	2018/07/26	88	50 - 130	104	50 - 130	108	%				
5648754	D14-Terphenyl (FS)	2018/07/26	104	50 - 130	101	50 - 130	106	%				
5648754	D8-Acenaphthylene	2018/07/26	97	50 - 130	102	50 - 130	100	%				
5648878	Isobutylbenzene - Extractable	2018/07/27	99	70 - 130	93	70 - 130	100	%				
5648878	n-Dotriacontane - Extractable	2018/07/27	100	70 - 130	96	70 - 130	92	%				
5648960	D10-Anthracene	2018/07/27	95	50 - 130	96	50 - 130	81	%				
5648960	D14-Terphenyl (FS)	2018/07/27	93	50 - 130	97	50 - 130	82	%				
5648960	D8-Acenaphthylene	2018/07/27	94	50 - 130	97	50 - 130	94	%				
5649293	Decachlorobiphenyl	2018/07/30	144 (3)	70 - 130	88	70 - 130	93	%				
5651374	Isobutylbenzene - Volatile	2018/07/28	106	60 - 130	104	60 - 130	99	%				
5644116	Aroclor 1016	2018/07/25					<0.050	ug/L	NC	40		
5644116	Aroclor 1221	2018/07/25					<0.050	ug/L	NC	40		
5644116	Aroclor 1232	2018/07/25					<0.050	ug/L	NC	40		
5644116	Aroclor 1242	2018/07/25					<0.050	ug/L	NC	40		
5644116	Aroclor 1248	2018/07/25					<0.050	ug/L	NC	40		
5644116	Aroclor 1254	2018/07/25	62 (1)	70 - 130	112	70 - 130	<0.050	ug/L	NC	40		
5644116	Aroclor 1260	2018/07/25					<0.050	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5644308	Total Aluminum (Al)	2018/07/26	107	80 - 120	106	80 - 120	<5.0	ug/L				
5644308	Total Antimony (Sb)	2018/07/26	106	80 - 120	107	80 - 120	<1.0	ug/L				
5644308	Total Arsenic (As)	2018/07/26	98	80 - 120	98	80 - 120	<1.0	ug/L				
5644308	Total Barium (Ba)	2018/07/26	99	80 - 120	99	80 - 120	<1.0	ug/L				
5644308	Total Beryllium (Be)	2018/07/26	106	80 - 120	105	80 - 120	<1.0	ug/L				
5644308	Total Bismuth (Bi)	2018/07/26	105	80 - 120	105	80 - 120	<2.0	ug/L				
5644308	Total Boron (B)	2018/07/26	107	80 - 120	105	80 - 120	<50	ug/L				
5644308	Total Cadmium (Cd)	2018/07/26	106	80 - 120	104	80 - 120	<0.010	ug/L				
5644308	Total Calcium (Ca)	2018/07/26	104	80 - 120	105	80 - 120	<100	ug/L				
5644308	Total Chromium (Cr)	2018/07/26	100	80 - 120	102	80 - 120	<1.0	ug/L				
5644308	Total Cobalt (Co)	2018/07/26	101	80 - 120	103	80 - 120	<0.40	ug/L				
5644308	Total Copper (Cu)	2018/07/26	NC	80 - 120	104	80 - 120	<2.0	ug/L				
5644308	Total Iron (Fe)	2018/07/26	107	80 - 120	108	80 - 120	<50	ug/L				
5644308	Total Lead (Pb)	2018/07/25	104	80 - 120	103	80 - 120	<0.50	ug/L	0.25	20		
5644308	Total Magnesium (Mg)	2018/07/26	104	80 - 120	107	80 - 120	<100	ug/L				
5644308	Total Manganese (Mn)	2018/07/26	100	80 - 120	103	80 - 120	<2.0	ug/L				
5644308	Total Molybdenum (Mo)	2018/07/26	105	80 - 120	110	80 - 120	<2.0	ug/L				
5644308	Total Nickel (Ni)	2018/07/26	99	80 - 120	102	80 - 120	<2.0	ug/L				
5644308	Total Phosphorus (P)	2018/07/26	106	80 - 120	104	80 - 120	<100	ug/L				
5644308	Total Potassium (K)	2018/07/26	106	80 - 120	104	80 - 120	<100	ug/L				
5644308	Total Selenium (Se)	2018/07/26	100	80 - 120	99	80 - 120	<1.0	ug/L				
5644308	Total Silver (Ag)	2018/07/26	97	80 - 120	97	80 - 120	<0.10	ug/L				
5644308	Total Sodium (Na)	2018/07/26	97	80 - 120	101	80 - 120	<100	ug/L				
5644308	Total Strontium (Sr)	2018/07/26	104	80 - 120	105	80 - 120	<2.0	ug/L				
5644308	Total Thallium (Tl)	2018/07/26	104	80 - 120	102	80 - 120	<0.10	ug/L				
5644308	Total Tin (Sn)	2018/07/26	106	80 - 120	105	80 - 120	<2.0	ug/L				
5644308	Total Titanium (Ti)	2018/07/26	101	80 - 120	101	80 - 120	<2.0	ug/L				
5644308	Total Uranium (U)	2018/07/26	106	80 - 120	106	80 - 120	<0.10	ug/L				
5644308	Total Vanadium (V)	2018/07/26	101	80 - 120	103	80 - 120	<2.0	ug/L				
5644308	Total Zinc (Zn)	2018/07/26	NC	80 - 120	100	80 - 120	<5.0	ug/L				
5644700	1,1,1-Trichloroethane	2018/07/24	99	70 - 130	101	70 - 130	<1.0	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5644700	1,1,2,2-Tetrachloroethane	2018/07/24	97	70 - 130	94	70 - 130	<0.50	ug/L	NC	40		
5644700	1,1,2-Trichloroethane	2018/07/24	103	70 - 130	99	70 - 130	<1.0	ug/L	NC	40		
5644700	1,1-Dichloroethane	2018/07/24	108	70 - 130	108	70 - 130	<2.0	ug/L	NC	40		
5644700	1,1-Dichloroethylene	2018/07/24	92	70 - 130	94	70 - 130	<0.50	ug/L	NC	40		
5644700	1,2-Dichlorobenzene	2018/07/24	91	70 - 130	90	70 - 130	<0.50	ug/L	NC	40		
5644700	1,2-Dichloroethane	2018/07/24	98	70 - 130	94	70 - 130	<1.0	ug/L	NC	40		
5644700	1,2-Dichloropropane	2018/07/24	95	70 - 130	95	70 - 130	<0.50	ug/L	NC	40		
5644700	1,3-Dichlorobenzene	2018/07/24	90	70 - 130	90	70 - 130	<1.0	ug/L	NC	40		
5644700	1,4-Dichlorobenzene	2018/07/24	90	70 - 130	88	70 - 130	<1.0	ug/L	NC	40		
5644700	Benzene	2018/07/24	93	70 - 130	93	70 - 130	<1.0	ug/L	NC	40		
5644700	Bromodichloromethane	2018/07/24	91	70 - 130	90	70 - 130	<1.0	ug/L	NC	40		
5644700	Bromoform	2018/07/24	102	70 - 130	98	70 - 130	<1.0	ug/L	NC	40		
5644700	Bromomethane	2018/07/24	98	60 - 140	100	60 - 140	<0.50	ug/L	NC	40		
5644700	Carbon Tetrachloride	2018/07/24	95	70 - 130	97	70 - 130	<0.50	ug/L	NC	40		
5644700	Chlorobenzene	2018/07/24	94	70 - 130	93	70 - 130	<1.0	ug/L	NC	40		
5644700	Chloroethane	2018/07/24	96	60 - 140	96	60 - 140	<8.0	ug/L	NC	40		
5644700	Chloroform	2018/07/24	87	70 - 130	86	70 - 130	<1.0	ug/L	NC	40		
5644700	Chloromethane	2018/07/24	87	60 - 140	87	60 - 140	<8.0	ug/L	NC	40		
5644700	cis-1,2-Dichloroethylene	2018/07/24	100	70 - 130	98	70 - 130	<0.50	ug/L	NC	40		
5644700	cis-1,3-Dichloropropene	2018/07/24	97	70 - 130	101	70 - 130	<0.50	ug/L	NC	40		
5644700	Dibromochloromethane	2018/07/24	100	70 - 130	98	70 - 130	<1.0	ug/L	NC	40		
5644700	Ethylbenzene	2018/07/24	94	70 - 130	95	70 - 130	<1.0	ug/L	NC	40		
5644700	Ethylene Dibromide	2018/07/24	100	70 - 130	97	70 - 130	<0.20	ug/L	NC	40		
5644700	Methyl t-butyl ether (MTBE)	2018/07/24	96	70 - 130	96	70 - 130	<2.0	ug/L	NC	40		
5644700	Methylene Chloride(Dichloromethane)	2018/07/24	97	70 - 130	97	70 - 130	<3.0	ug/L	NC	40		
5644700	o-Xylene	2018/07/24	96	70 - 130	97	70 - 130	<1.0	ug/L	NC	40		
5644700	p+m-Xylene	2018/07/24	95	70 - 130	96	70 - 130	<2.0	ug/L	NC	40		
5644700	Styrene	2018/07/24	103	70 - 130	102	70 - 130	<1.0	ug/L	NC	40		
5644700	Tetrachloroethylene	2018/07/24	98	70 - 130	100	70 - 130	<1.0	ug/L	NC	40		
5644700	Toluene	2018/07/24	97	70 - 130	98	70 - 130	<1.0	ug/L	NC	40		
5644700	Total Trihalomethanes	2018/07/24					<1.0	ug/L	NC	40		

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5644700	Total Xylenes	2018/07/24					<1.0	ug/L	NC	40		
5644700	trans-1,2-Dichloroethylene	2018/07/24	95	70 - 130	95	70 - 130	<0.50	ug/L	NC	40		
5644700	trans-1,3-Dichloropropene	2018/07/24	97	70 - 130	100	70 - 130	<0.50	ug/L	NC	40		
5644700	Trichloroethylene	2018/07/24	98	70 - 130	99	70 - 130	<1.0	ug/L	NC	40		
5644700	Trichlorofluoromethane (FREON 11)	2018/07/24	97	60 - 140	99	60 - 140	<8.0	ug/L	NC	40		
5644700	Vinyl Chloride	2018/07/24	95	60 - 140	95	60 - 140	<0.50	ug/L	NC	40		
5645176	Nitrogen (Ammonia Nitrogen)	2018/07/24	97	80 - 120	103	80 - 120	<0.050	mg/L	6.5	20		
5645293	1-Methylnaphthalene	2018/07/26	78	50 - 130	77	50 - 130	<0.050	ug/L				
5645293	2-Methylnaphthalene	2018/07/26	83	50 - 130	82	50 - 130	<0.050	ug/L				
5645293	Acenaphthene	2018/07/26	87	50 - 130	87	50 - 130	<0.010	ug/L				
5645293	Acenaphthylene	2018/07/26	89	50 - 130	89	50 - 130	<0.010	ug/L				
5645293	Anthracene	2018/07/26	77	50 - 130	80	50 - 130	<0.010	ug/L				
5645293	Benzo(a)anthracene	2018/07/26	82	50 - 130	84	50 - 130	<0.010	ug/L				
5645293	Benzo(a)pyrene	2018/07/26	88	50 - 130	86	50 - 130	<0.010	ug/L	NC	40		
5645293	Benzo(b)fluoranthene	2018/07/26	107	50 - 130	107	50 - 130	<0.010	ug/L				
5645293	Benzo(g,h,i)perylene	2018/07/26	98	50 - 130	86	50 - 130	<0.010	ug/L				
5645293	Benzo(j)fluoranthene	2018/07/26	93	50 - 130	93	50 - 130	<0.010	ug/L				
5645293	Benzo(k)fluoranthene	2018/07/26	101	50 - 130	98	50 - 130	<0.010	ug/L				
5645293	Chrysene	2018/07/26	80	50 - 130	82	50 - 130	<0.010	ug/L				
5645293	Dibenz(a,h)anthracene	2018/07/26	87	50 - 130	70	50 - 130	<0.010	ug/L				
5645293	Fluoranthene	2018/07/26	81	50 - 130	85	50 - 130	<0.010	ug/L				
5645293	Fluorene	2018/07/26	96	50 - 130	95	50 - 130	<0.010	ug/L				
5645293	Indeno(1,2,3-cd)pyrene	2018/07/26	87	50 - 130	79	50 - 130	<0.010	ug/L				
5645293	Naphthalene	2018/07/26	85	50 - 130	84	50 - 130	<0.20	ug/L				
5645293	Perylene	2018/07/26	83	50 - 130	80	50 - 130	<0.010	ug/L				
5645293	Phenanthrene	2018/07/26	99	50 - 130	95	50 - 130	<0.010	ug/L				
5645293	Pyrene	2018/07/26	82	50 - 130	85	50 - 130	<0.010	ug/L				
5646434	Benzene	2018/07/26	114	70 - 130	111	70 - 130	<0.0010	mg/L	NC	40		
5646434	C6 - C10 (less BTEX)	2018/07/26					<0.010	mg/L	NC	40		
5646434	Ethylbenzene	2018/07/26	117	70 - 130	112	70 - 130	<0.0010	mg/L	NC	40		
5646434	Toluene	2018/07/26	114	70 - 130	110	70 - 130	<0.0010	mg/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5646434	Total Xylenes	2018/07/26	115	70 - 130	109	70 - 130	<0.0020	mg/L	NC	40		
5646498	Total Alkalinity (Total as CaCO3)	2018/07/25	103	80 - 120	107	80 - 120	<5.0	mg/L	1.3	25		
5646506	Dissolved Chloride (Cl-)	2018/07/26	101	80 - 120	104	80 - 120	<1.0	mg/L	0.54	25	110	80 - 120
5646507	Dissolved Sulphate (SO4)	2018/07/25	97	80 - 120	96	80 - 120	<2.0	mg/L	2.0	25		
5646513	Reactive Silica (SiO2)	2018/07/26	97	80 - 120	96	80 - 120	<0.50	mg/L	0.33	25		
5646519	Colour	2018/07/25			103	80 - 120	<5.0	TCU	NC	20		
5646520	Orthophosphate (P)	2018/07/25	NC	80 - 120	95	80 - 120	<0.010	mg/L	6.0	25		
5646522	Nitrate + Nitrite (N)	2018/07/26	93	80 - 120	91	80 - 120	<0.050	mg/L	NC	25		
5646524	Nitrite (N)	2018/07/26	96	80 - 120	100	80 - 120	<0.010	mg/L	NC	20		
5646698	>C10-C16 Hydrocarbons	2018/07/27	101	70 - 130	107	70 - 130	<0.050	mg/L	NC	40		
5646698	>C16-C21 Hydrocarbons	2018/07/27	93	70 - 130	101	70 - 130	<0.050	mg/L	NC	40		
5646698	>C21-<C32 Hydrocarbons	2018/07/27	111	70 - 130	127	70 - 130	<0.10	mg/L	NC	40		
5646701	>C10-C16 Hydrocarbons	2018/07/28	101	70 - 130	93	70 - 130	<0.050	mg/L	NC	40		
5646701	>C16-C21 Hydrocarbons	2018/07/28	97	70 - 130	88	70 - 130	<0.050	mg/L	NC	40		
5646701	>C21-<C32 Hydrocarbons	2018/07/28	118	70 - 130	106	70 - 130	<0.10	mg/L	NC	40		
5646753	Moisture	2018/07/26							1.9	25		
5646804	Nitrogen (Ammonia Nitrogen)	2018/07/26	NC	80 - 120	105	80 - 120	<0.050	mg/L	0.98	20		
5646808	Nitrogen (Ammonia Nitrogen)	2018/07/25	97	80 - 120	98	80 - 120	<0.050	mg/L	NC	20		
5646813	Nitrogen (Ammonia Nitrogen)	2018/07/26	103	80 - 120	99	80 - 120	<0.050	mg/L	15	20		
5647278	Total Organic Carbon (C)	2018/07/26	100	85 - 115	97	80 - 120	<0.50	mg/L	NC	15		
5648629	>C10-C16 Hydrocarbons	2018/07/27	89	30 - 130	90	60 - 130	<10	mg/kg	42	50		
5648629	>C16-C21 Hydrocarbons	2018/07/27	NC	30 - 130	89	60 - 130	<10	mg/kg	40	50		
5648629	>C21-<C32 Hydrocarbons	2018/07/27	NC	30 - 130	114	60 - 130	<15	mg/kg	40	50		
5648634	Turbidity	2018/07/26			99	80 - 120	<0.10	NTU	16	20	95	80 - 120
5648640	Turbidity	2018/07/26			100	80 - 120	<0.10	NTU	6.0	20	95	80 - 120
5648693	pH	2018/07/26							0.65	N/A	100	97 - 103
5648700	Conductivity	2018/07/26			102	80 - 120	1.6, RDL=1.0	uS/cm	1.7	25		
5648711	pH	2018/07/26							0.40	N/A	100	97 - 103
5648715	Conductivity	2018/07/26			102	80 - 120	1.1, RDL=1.0	uS/cm	1.9	25		
5648754	1-Methylnaphthalene	2018/07/26	84	50 - 130	83	50 - 130	<0.010	mg/kg	NC	50		
5648754	2-Methylnaphthalene	2018/07/26	90	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5648754	Acenaphthene	2018/07/26	89	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648754	Acenaphthylene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648754	Anthracene	2018/07/26	90	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(a)anthracene	2018/07/26	89	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(a)pyrene	2018/07/26	87	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(b)fluoranthene	2018/07/26	94	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(g,h,i)perylene	2018/07/26	96	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(j)fluoranthene	2018/07/26	88	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50		
5648754	Benzo(k)fluoranthene	2018/07/26	91	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50		
5648754	Chrysene	2018/07/26	86	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50		
5648754	Dibenz(a,h)anthracene	2018/07/26	88	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50		
5648754	Fluoranthene	2018/07/26	91	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50		
5648754	Fluorene	2018/07/26	94	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50		
5648754	Indeno(1,2,3-cd)pyrene	2018/07/26	85	50 - 130	81	50 - 130	<0.010	mg/kg	NC	50		
5648754	Naphthalene	2018/07/26	89	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50		
5648754	Perylene	2018/07/26	89	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50		
5648754	Phenanthrene	2018/07/26	97	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50		
5648754	Pyrene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648874	Total Organic Carbon (C)	2018/07/26	NC	85 - 115	97	80 - 120	<0.50	mg/L	1.3	15		
5648876	Total Organic Carbon (C)	2018/07/27	97	85 - 115	97	80 - 120	<0.50	mg/L	5.0 (2)	15		
5648878	>C10-C16 Hydrocarbons	2018/07/27	97	70 - 130	92	70 - 130	<0.050	mg/L	NC	40		
5648878	>C16-C21 Hydrocarbons	2018/07/27	94	70 - 130	87	70 - 130	<0.050	mg/L	NC	40		
5648878	>C21-<C32 Hydrocarbons	2018/07/27	111	70 - 130	105	70 - 130	<0.10	mg/L	NC	40		
5648957	Acid Extractable Aluminum (Al)	2018/07/27					<10	mg/kg	4.3	35		
5648957	Acid Extractable Antimony (Sb)	2018/07/27	100	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Arsenic (As)	2018/07/27	98	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Barium (Ba)	2018/07/27	104	75 - 125	101	75 - 125	<5.0	mg/kg	10	35		
5648957	Acid Extractable Beryllium (Be)	2018/07/27	102	75 - 125	99	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Bismuth (Bi)	2018/07/27	103	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Boron (B)	2018/07/27	101	75 - 125	104	75 - 125	<50	mg/kg	NC	35		
5648957	Acid Extractable Cadmium (Cd)	2018/07/27	103	75 - 125	107	75 - 125	<0.30	mg/kg	NC	35		

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5648957	Acid Extractable Chromium (Cr)	2018/07/27	101	75 - 125	97	75 - 125	<2.0	mg/kg	5.4	35		
5648957	Acid Extractable Cobalt (Co)	2018/07/27	100	75 - 125	98	75 - 125	<1.0	mg/kg	6.3	35		
5648957	Acid Extractable Copper (Cu)	2018/07/27	99	75 - 125	97	75 - 125	<2.0	mg/kg	2.3	35		
5648957	Acid Extractable Iron (Fe)	2018/07/27					<50	mg/kg	0.76	35		
5648957	Acid Extractable Lead (Pb)	2018/07/27	99	75 - 125	98	75 - 125	<0.50	mg/kg	4.5	35		
5648957	Acid Extractable Lithium (Li)	2018/07/27	102	75 - 125	99	75 - 125	<2.0	mg/kg	21	35		
5648957	Acid Extractable Manganese (Mn)	2018/07/27	NC	75 - 125	101	75 - 125	<2.0	mg/kg	8.4	35		
5648957	Acid Extractable Mercury (Hg)	2018/07/27	95	75 - 125	109	75 - 125	<0.10	mg/kg	NC	35		
5648957	Acid Extractable Molybdenum (Mo)	2018/07/27	100	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Nickel (Ni)	2018/07/27	99	75 - 125	98	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Rubidium (Rb)	2018/07/27	100	75 - 125	100	75 - 125	<2.0	mg/kg	4.6	35		
5648957	Acid Extractable Selenium (Se)	2018/07/27	102	75 - 125	105	75 - 125	<1.0	mg/kg	NC	35		
5648957	Acid Extractable Silver (Ag)	2018/07/27	99	75 - 125	102	75 - 125	<0.50	mg/kg	NC	35		
5648957	Acid Extractable Strontium (Sr)	2018/07/27	103	75 - 125	99	75 - 125	<5.0	mg/kg	3.4	35		
5648957	Acid Extractable Thallium (Tl)	2018/07/27	99	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35		
5648957	Acid Extractable Tin (Sn)	2018/07/27	100	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35		
5648957	Acid Extractable Uranium (U)	2018/07/27	98	75 - 125	98	75 - 125	<0.10	mg/kg	2.3	35		
5648957	Acid Extractable Vanadium (V)	2018/07/27	104	75 - 125	99	75 - 125	<2.0	mg/kg	15	35		
5648957	Acid Extractable Zinc (Zn)	2018/07/27	111	75 - 125	96	75 - 125	<5.0	mg/kg	13	35		
5648960	1-Methylnaphthalene	2018/07/27	81	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50		
5648960	2-Methylnaphthalene	2018/07/27	88	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50		
5648960	Acenaphthene	2018/07/27	87	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648960	Acenaphthylene	2018/07/27	95	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50		
5648960	Anthracene	2018/07/27	85	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(a)anthracene	2018/07/27	85	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(a)pyrene	2018/07/27	83	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(b)fluoranthene	2018/07/27	104	50 - 130	102	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(g,h,i)perylene	2018/07/27	89	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(j)fluoranthene	2018/07/27	84	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		
5648960	Benzo(k)fluoranthene	2018/07/27	92	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50		
5648960	Chrysene	2018/07/27	80	50 - 130	85	50 - 130	<0.010	mg/kg	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5648960	Dibenz(a,h)anthracene	2018/07/27	84	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648960	Fluoranthene	2018/07/27	85	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50		
5648960	Fluorene	2018/07/27	95	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50		
5648960	Indeno(1,2,3-cd)pyrene	2018/07/27	81	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50		
5648960	Naphthalene	2018/07/27	90	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50		
5648960	Perylene	2018/07/27	79	50 - 130	83	50 - 130	<0.010	mg/kg	NC	50		
5648960	Phenanthrene	2018/07/27	85	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50		
5648960	Pyrene	2018/07/27	86	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50		
5649293	Aroclor 1016	2018/07/30					<0.050	ug/g	NC	50		
5649293	Aroclor 1221	2018/07/30					<0.050	ug/g	NC	50		
5649293	Aroclor 1232	2018/07/30					<0.050	ug/g	NC	50		
5649293	Aroclor 1242	2018/07/30					<0.050	ug/g	NC	50		
5649293	Aroclor 1248	2018/07/30					<0.050	ug/g	NC	50		
5649293	Aroclor 1254	2018/07/30	80	70 - 130	106	70 - 130	<0.050	ug/g	NC	50		
5649293	Aroclor 1260	2018/07/30					<0.050	ug/g	NC	50		
5651374	Benzene	2018/07/28	102	60 - 130	105	60 - 140	<0.025	mg/kg	NC	50		
5651374	C6 - C10 (less BTEX)	2018/07/28					<2.5	mg/kg	NC	50		
5651374	Ethylbenzene	2018/07/28	103	60 - 130	103	60 - 140	<0.025	mg/kg	NC	50		
5651374	Toluene	2018/07/28	93	60 - 130	100	60 - 140	<0.025	mg/kg	NC	50		

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Maxxam Job #: B8I4514
Report Date: 2018/07/30

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5651374	Total Xylenes	2018/07/28	100	60 - 130	100	60 - 140	<0.050	mg/kg	NC	50		

N/A = Not Applicable

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

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix Spike: results are outside acceptance limit. Insufficient sample for repeat analysis.

(2) Elevated reporting limit due to turbidity.

(3) PCB surrogate outside acceptance limits. No effect on data quality. Data accepted.

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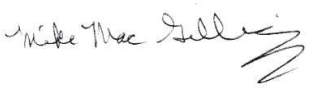
Maxxam Job #: B8I4514
Report Date: 2018/07/30

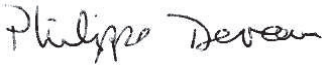
Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: RP

VALIDATION SIGNATURE PAGE

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



Mike MacGillivray, Scientific Specialist (Inorganics)



Phil Deveau, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33407 Page 1 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	X Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Ikkey Drive, St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 7095761458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9,3 11,6 10,4	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable); NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-SED01	2018/07/17		SED									X				X				X		X					
2	2018-SED02												X				X				X		X					
3	2018-SED03												X				X				X		X					
4	2018-SED04												X				X				X		X					
5	2018-SED05												X				X						X					
6	2018-SED06												X															
7	2018-SED07												X				X				X							
8	2018-SED08												X				X						X					
9	2018-SED09												X				X				X							
10	2018-SED10												X				X						X					

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Letto	2018/07/20	9:24	B8I4514

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

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465 George Street,Unit G,Sydney, NS B1P 1K5 Tel: 902-567-1255 Fax: 902-539-6504 Toll Free: 1-888-535-7770
www.maxxam.ca E-mail: Customerservicebedford@maxxam.ca

CHAIN OF CUSTODY RECORD

COC #: D33408 Page 2 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive, St John's NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.3 11.6 10.4	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable); NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-SW01	2018/07/17		Water		Not Filtered		X									X				X		X	X				
2	2018-SW02							X									X				X		X	X				
3	2018-SW03							X									X							X				
4	2018-SW04							X									X							X				
5	2018-SW05							X									X				X		X	X				
6	2018-SW06							X									X							X				
7	2018-SW07							X									X							X				
8	2018-SW08							X									X							X				
9	2018-SW09							X									X							X				
10	2018-SW10							X									X							X				

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jesse Lefler	2018/07/20	9:24	B8I4514

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

Maxxam
A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33421

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/23
Report #: R5369897
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5432
Received: 2018/07/23, 08:52

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	5	N/A	2018/07/27	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	1	2018/07/26	2018/07/27	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	7	2018/07/26	2018/07/28	ATL SOP 00111	Atl. RBCA v3.1 m
Moisture	10	N/A	2018/07/25	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	1	2018/07/25	2018/07/26	ATL SOP 00102	EPA 8270E 2017 m
PAH Compounds by GCMS (SIM) (1)	4	2018/07/25	2018/07/27	ATL SOP 00102	EPA 8270E 2017 m
ModTPH (T1) Calc. for Soil	8	N/A	2018/07/30	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	5	N/A	2018/07/27	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	2	N/A	2018/07/28	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	1	N/A	2018/07/29	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam
A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33421

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/23
Report #: R5369897
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5432

Received: 2018/07/23, 08:52

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Kavya Nair
Project Manager Assistant
23 Aug 2018 15:12:11

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHG932	HHG933	HHG934	HHG934			
Sampling Date		2018/07/14	2018/07/14	2018/07/14	2018/07/14			
COC Number		D33421	D33421	D33421	D33421			
	UNITS	**2018-MW31-GP09**	**2018-MW21-GP01**	**2018-MW21-GP02**	**2018-MW21-GP02 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	15	13	13	13	1.0	5646395	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HHG935	HHG936	HHG937	HHG938			
Sampling Date		2018/07/14	2018/07/14	2018/07/14	2018/07/14			
COC Number		D33421	D33421	D33421	D33421			
	UNITS	**2018-MW27-GP01**	**2018-MW27-GP07**	**2018-MW27-GP08**	**2018-BH28-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	18	14	13	13	1.0	5646395	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHG939	HHG940	HHG941			
Sampling Date		2018/07/14	2018/07/14	2018/07/14			
COC Number		D33421	D33421	D33421			
	UNITS	**2018-BH29-GP01**	**2018-BH30-GP07**	**2018-MW31-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics							
Moisture	%	9.5	14	7.7	1.0	5646395	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHG933		HHG935		HHG936			
Sampling Date		2018/07/14		2018/07/14		2018/07/14			
COC Number		D33421		D33421		D33421			
	UNITS	**2018-MW21-GP01**	**RDL**	**2018-MW27-GP01**	**RDL**	**2018-MW27-GP07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	0.25	0.010	5646981	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	<0.030 (1)	0.030	0.040	0.010	5646981	N/A
Acenaphthene	mg/kg	<0.010	0.010	<0.070 (1)	0.070	<0.010	0.010	5646981	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.040 (1)	0.040	<0.010	0.010	5646981	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Fluorene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.040 (1)	0.040	<0.010	0.010	5646981	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.020 (1)	0.020	5646981	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	0.010	5646981	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	94		101		99		5646981	
D14-Terphenyl (FS)	%	99		102		99		5646981	
D8-Acenaphthylene	%	102		105		103		5646981	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHG938		HHG939			
Sampling Date		2018/07/14		2018/07/14			
COC Number		D33421		D33421			
	UNITS	**2018-BH28-GP02**	**RDL**	**2018-BH29-GP01**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	0.65	0.010	<0.010	0.010	5646981	N/A
2-Methylnaphthalene	mg/kg	0.71	0.010	0.021	0.010	5646981	N/A
Acenaphthene	mg/kg	<0.060 (1)	0.060	<0.010	0.010	5646981	N/A
Acenaphthylene	mg/kg	<0.080 (1)	0.080	<0.010	0.010	5646981	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Fluorene	mg/kg	<0.020 (1)	0.020	<0.010	0.010	5646981	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Phenanthrene	mg/kg	0.088	0.010	<0.010	0.010	5646981	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	0.010	5646981	N/A
Surrogate Recovery (%)							
D10-Anthracene	%	97		100		5646981	
D14-Terphenyl (FS)	%	99		101		5646981	
D8-Acenaphthylene	%	98		106		5646981	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHG932		HHG934	HHG935			
Sampling Date		2018/07/14		2018/07/14	2018/07/14			
COC Number		D33421		D33421	D33421			
	UNITS	**2018-MW31-GP09**	**RDL**	**2018-MW21-GP02**	**2018-MW27-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	0.025	<0.025	<0.025	0.025	5651374	N/A
Toluene	mg/kg	<0.025	0.025	<0.025	<0.025	0.025	5651374	N/A
Ethylbenzene	mg/kg	<0.025	0.025	<0.025	<0.025	0.025	5651374	0.025
Total Xylenes	mg/kg	3.1	0.050	<0.050	<0.050	0.050	5651374	N/A
C6 - C10 (less BTEX)	mg/kg	460 (1)	25	23	9.1	2.5	5651374	N/A
>C10-C16 Hydrocarbons	mg/kg	1200	10	620	720	10	5648824	N/A
>C16-C21 Hydrocarbons	mg/kg	150	10	110	44	10	5648824	N/A
>C21-<C32 Hydrocarbons	mg/kg	64	15	71	36	15	5648824	N/A
Modified TPH (Tier1)	mg/kg	1800	25	820	800	15	5644068	N/A
Reached Baseline at C32	mg/kg	Yes	N/A	Yes	Yes	N/A	5648824	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (2)	N/A	COMMENT (3)	COMMENT (3)	N/A	5648824	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	114		103	93		5648824	
n-Dotriacontane - Extractable	%	102		100	105		5648824	
Isobutylbenzene - Volatile	%	74		114	108		5651374	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) Fuel oil fraction.
(3) One product in fuel oil range.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHG937				HHG937			
Sampling Date		2018/07/14				2018/07/14			
COC Number		D33421				D33421			
	UNITS	**2018-MW27-GP08**	**RDL**	**QC Batch**	**MDL**	**2018-MW27-GP08 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5651384	N/A				
Toluene	mg/kg	<0.025	0.025	5651384	N/A				
Ethylbenzene	mg/kg	<0.025	0.025	5651384	0.025				
Total Xylenes	mg/kg	0.34	0.050	5651384	N/A				
C6 - C10 (less BTEX)	mg/kg	94	2.5	5651384	N/A				
>C10-C16 Hydrocarbons	mg/kg	250	10	5648819	N/A	220	10	5648819	N/A
>C16-C21 Hydrocarbons	mg/kg	32	10	5648819	N/A	30	10	5648819	N/A
>C21-<C32 Hydrocarbons	mg/kg	25	15	5648819	N/A	20	15	5648819	N/A
Modified TPH (Tier1)	mg/kg	400	15	5644068	N/A				
Reached Baseline at C32	mg/kg	Yes	N/A	5648819	N/A				
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	N/A	5648819	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	113		5648819		106		5648819	
n-Dotriacontane - Extractable	%	124		5648819		115		5648819	
Isobutylbenzene - Volatile	%	96 (2)		5651384					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Fuel oil fraction.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHG938	HHG939	HHG940	HHG941			
Sampling Date		2018/07/14	2018/07/14	2018/07/14	2018/07/14			
COC Number		D33421	D33421	D33421	D33421			
	UNITS	**2018-BH28-GP02**	**2018-BH29-GP01**	**2018-BH30-GP07**	**2018-MW31-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5651384	N/A
Toluene	mg/kg	<0.025	0.098	<0.025	<0.025	0.025	5651384	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5651384	0.025
Total Xylenes	mg/kg	<0.050	0.30	1.2	<0.050	0.050	5651384	N/A
C6 - C10 (less BTEX)	mg/kg	130	22	230	<2.5	2.5	5651384	N/A
>C10-C16 Hydrocarbons	mg/kg	900	41	1800	31	10	5648824	N/A
>C16-C21 Hydrocarbons	mg/kg	87	18	190	100	10	5648824	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	21	62	1200	15	5648824	N/A
Modified TPH (Tier1)	mg/kg	1100	100	2300	1300	15	5644068	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	Yes	No	N/A	5648824	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (2)	COMMENT (1)	COMMENT (3)	N/A	5648824	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	92	91	114	92		5648824	
n-Dotriacontane - Extractable	%	109	107	103	105		5648824	
Isobutylbenzene - Volatile	%	77	135 (4)	65	92 (5)		5651384	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) One product in fuel oil range.
(3) Lube oil fraction.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHG932 **Collected:** 2018/07/14
Sample ID: 2018-MW31-GP09 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/27	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/29	Jacob Henley

Maxxam ID: HHG933 **Collected:** 2018/07/14
Sample ID: 2018-MW21-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5646981	2018/07/25	2018/07/26	Lisa Gates

Maxxam ID: HHG934 **Collected:** 2018/07/14
Sample ID: 2018-MW21-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHG934 Dup **Collected:** 2018/07/14
Sample ID: 2018-MW21-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar

Maxxam ID: HHG935 **Collected:** 2018/07/14
Sample ID: 2018-MW27-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5646981	2018/07/25	2018/07/27	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651374	N/A	2018/07/28	Jacob Henley

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHG936
Sample ID: 2018-MW27-GP07
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5646981	2018/07/25	2018/07/27	Lisa Gates

Maxxam ID: HHG937
Sample ID: 2018-MW27-GP08
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

Maxxam ID: HHG937 Dup
Sample ID: 2018-MW27-GP08
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney

Maxxam ID: HHG938
Sample ID: 2018-BH28-GP02
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5646981	2018/07/25	2018/07/27	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

Maxxam ID: HHG939
Sample ID: 2018-BH29-GP01
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5646981	2018/07/25	2018/07/27	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHG940
Sample ID: 2018-BH30-GP07
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

Maxxam ID: HHG941
Sample ID: 2018-MW31-GP01
Matrix: Soil

Collected: 2018/07/14
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648824	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5646395	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	5.9°C

Revised Report: Report re-issued due to IT related error. KN1 2018/08/23

Results relate only to the items tested.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5646981	D10-Anthracene	2018/07/26	98	50 - 130	95	50 - 130	96	%		
5646981	D14-Terphenyl (FS)	2018/07/26	101	50 - 130	98	50 - 130	99	%		
5646981	D8-Acenaphthylene	2018/07/26	101	50 - 130	108	50 - 130	103	%		
5648819	Isobutylbenzene - Extractable	2018/07/28	110	60 - 130	96	60 - 130	94	%		
5648819	n-Dotriacontane - Extractable	2018/07/28	119	60 - 130	120	60 - 130	119	%		
5648824	Isobutylbenzene - Extractable	2018/07/27	88	60 - 130	87	60 - 130	87	%		
5648824	n-Dotriacontane - Extractable	2018/07/27	99	60 - 130	106	60 - 130	104	%		
5651374	Isobutylbenzene - Volatile	2018/07/28	106	60 - 130	104	60 - 130	99	%		
5651384	Isobutylbenzene - Volatile	2018/07/27	83 (1)	60 - 130	96	60 - 130	102	%		
5646395	Moisture	2018/07/25							3.9	25
5646981	1-Methylnaphthalene	2018/07/27	80	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5646981	2-Methylnaphthalene	2018/07/27	88	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5646981	Acenaphthene	2018/07/27	93	50 - 130	94	50 - 130	<0.010	mg/kg	7.1	50
5646981	Acenaphthylene	2018/07/27	95	50 - 130	98	50 - 130	<0.010	mg/kg	NC	50
5646981	Anthracene	2018/07/27	93	50 - 130	84	50 - 130	<0.010	mg/kg	6.1	50
5646981	Benzo(a)anthracene	2018/07/27	100	50 - 130	86	50 - 130	<0.010	mg/kg	2.5	50
5646981	Benzo(a)pyrene	2018/07/27	97	50 - 130	85	50 - 130	<0.010	mg/kg	6.7	50
5646981	Benzo(b)fluoranthene	2018/07/27	110	50 - 130	102	50 - 130	<0.010	mg/kg	1.1	50
5646981	Benzo(g,h,i)perylene	2018/07/27	99	50 - 130	90	50 - 130	<0.010	mg/kg	2.4	50
5646981	Benzo(j)fluoranthene	2018/07/27	92	50 - 130	86	50 - 130	<0.010	mg/kg	5.6	50
5646981	Benzo(k)fluoranthene	2018/07/27	102	50 - 130	94	50 - 130	<0.010	mg/kg	1.7	50
5646981	Chrysene	2018/07/27	95	50 - 130	82	50 - 130	<0.010	mg/kg	4.3	50
5646981	Dibenz(a,h)anthracene	2018/07/27	88	50 - 130	84	50 - 130	<0.010	mg/kg	12	50
5646981	Fluoranthene	2018/07/27	115	50 - 130	87	50 - 130	<0.010	mg/kg	4.5	50
5646981	Fluorene	2018/07/27	99	50 - 130	100	50 - 130	<0.010	mg/kg	6.9	50
5646981	Indeno(1,2,3-cd)pyrene	2018/07/27	89	50 - 130	81	50 - 130	<0.010	mg/kg	1.1	50
5646981	Naphthalene	2018/07/27	90	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5646981	Perylene	2018/07/27	86	50 - 130	82	50 - 130	<0.010	mg/kg	8.2	50
5646981	Phenanthrene	2018/07/27	115	50 - 130	86	50 - 130	<0.010	mg/kg	0.63	50
5646981	Pyrene	2018/07/27	109	50 - 130	85	50 - 130	<0.010	mg/kg	8.7	50
5648819	>C10-C16 Hydrocarbons	2018/07/28	NC	30 - 130	91	60 - 130	<10	mg/kg	14	50

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648819	>C16-C21 Hydrocarbons	2018/07/28	88	30 - 130	90	60 - 130	<10	mg/kg	6.4	50
5648819	>C21-<C32 Hydrocarbons	2018/07/28	110	30 - 130	122	60 - 130	<15	mg/kg	23	50
5648824	>C10-C16 Hydrocarbons	2018/07/27	NC	30 - 130	88	60 - 130	<10	mg/kg	33	50
5648824	>C16-C21 Hydrocarbons	2018/07/27	56	30 - 130	80	60 - 130	<10	mg/kg	32	50
5648824	>C21-<C32 Hydrocarbons	2018/07/27	NC	30 - 130	105	60 - 130	<15	mg/kg	40	50
5651374	Benzene	2018/07/28	102	60 - 130	105	60 - 140	<0.025	mg/kg	NC	50
5651374	C6 - C10 (less BTEX)	2018/07/28					<2.5	mg/kg	NC	50
5651374	Ethylbenzene	2018/07/28	103	60 - 130	103	60 - 140	<0.025	mg/kg	NC	50
5651374	Toluene	2018/07/28	93	60 - 130	100	60 - 140	<0.025	mg/kg	NC	50
5651374	Total Xylenes	2018/07/28	100	60 - 130	100	60 - 140	<0.050	mg/kg	NC	50
5651384	Benzene	2018/07/27	72	60 - 130	99	60 - 140	<0.025	mg/kg	NC	50
5651384	C6 - C10 (less BTEX)	2018/07/27					<2.5	mg/kg	NC	50
5651384	Ethylbenzene	2018/07/27	75	60 - 130	89	60 - 140	<0.025	mg/kg	NC	50
5651384	Toluene	2018/07/27	77	60 - 130	88	60 - 140	<0.025	mg/kg	NC	50
5651384	Total Xylenes	2018/07/27	73	60 - 130	87	60 - 140	<0.050	mg/kg	NC	50

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5432
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Phil Deveau, Scientific Specialist (Organics)

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

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ATL FCD 00149 / 22

CHAIN OF CUSTODY RECORD

COC #: D33421 Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	Stantec	Company Name:		Quotation #:		[X] Regular TAT (5 business days) Most analytes
Contact Name:	Jim Slade	Contact Name:		P.O. #:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address:	Postal Code:	Project #:	121414998	IF RUSH please specify date (Surcharges will be applied)
Phone:	709 576 1458 Fax:	Phone:	Fax:	Site Location:	Border Beacon	DATE REQUIRED:
Email:	James.Slade@stantec.com	Email:		Site #:		
				Sampled By:	AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		5.1 6.1 6.6	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean Sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy (Low Level BTEX, C6-C32)	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW31-GP09	2018/07/14		Soil													X										
2	2018-MW21-GP01	2018/07/14		Soil																	X						
3	2018-MW21-GP02																X										
4	2018-MW27-GP01																X				X						
5	2018-MW27-GP07																				X						
6	2018-MW27-GP08																X										
7	2018-BH28-GP02																X				X						
8	2018-BH29-GP01																X				X						
9	2018-BH30-GP07																X										
10	2018-MW31-GP01																X										

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Jelle LeMay	2018/07/20	9:24	B8I5432

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

White: Maxxam Pink: Client

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Your Project #: 121414998
Site Location: BORDER BEACON

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Your C.O.C. #: D 33401, D 33402, d 33403, D 33404, D 33405, D 33406

Report Date: 2018/08/24
Report #: R5371714
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5438
Received: 2018/07/23, 08:52

Sample Matrix: Soil
Samples Received: 53

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	1	N/A	2018/07/27	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil)	5	N/A	2018/07/28	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil)	6	N/A	2018/08/07	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil)	12	N/A	2018/08/11	N/A	Auto Calc.
TEH in Soil (AA PIRI)	1	2018/07/26	2018/08/03	ATL SOP 00116	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	1	2018/07/27	2018/07/31	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	6	2018/07/27	2018/08/01	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	20	2018/07/30	2018/07/30	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	15	2018/07/30	2018/07/31	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	1	2018/07/26	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	13	2018/07/27	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	5	2018/07/27	2018/07/28	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	12	2018/07/30	2018/07/31	ATL SOP 00058	EPA 6020A R1 m
Moisture	19	N/A	2018/07/25	ATL SOP 00001	OMOE Handbook 1983 m
Moisture	30	N/A	2018/07/26	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	6	2018/07/26	2018/07/27	ATL SOP 00102	EPA 8270E 2017 m
PAH Compounds by GCMS (SIM) (1)	12	2018/07/26	2018/08/09	ATL SOP 00102	EPA 8270E 2017 m
PAH Compounds by GCMS (SIM) (1)	1	2018/07/27	2018/08/03	ATL SOP 00102	EPA 8270E 2017 m
PAH Compounds by GCMS (SIM) (1)	5	2018/07/30	2018/08/03	ATL SOP 00102	EPA 8270E 2017 m
PCBs in soil by GC/ECD (1)	6	2018/07/26	2018/07/27	ATL SOP 00106	EPA 8082A 2007 m
PCBs in soil by GC/ECD (1)	5	2018/07/27	2018/07/31	ATL SOP 00106	EPA 8082A 2007 m
PCBs in soil by GC/ECD (1)	1	2018/07/30	2018/08/02	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	6	N/A	2018/07/27	N/A	Auto Calc.
PCB Aroclor sum (soil)	5	N/A	2018/07/31	N/A	Auto Calc.
PCB Aroclor sum (soil)	1	N/A	2018/08/02	N/A	Auto Calc.
ModTPH (T1) Calc. for Soil	18	N/A	2018/08/03	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	4	N/A	2018/08/04	N/A	Atl. RBCA v3.1 m
ModTPH (T1) Calc. for Soil	20	N/A	2018/08/07	N/A	Atl. RBCA v3.1 m

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Maxxam
A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Your C.O.C. #: D 33401, D 33402, d 33403, D 33404, D 33405, D 33406

Report Date: 2018/08/24
Report #: R5371714
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5438
Received: 2018/07/23, 08:52

Sample Matrix: Soil
Samples Received: 53

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
ModTPH (T2) Calc. for Soil	1	N/A	2018/08/04	N/A	Atl. RBCA v3 m
VPH in Soil (PIRI2) - Field Preserved (2)	1	N/A	2018/08/03	ATL SOP 00120	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	4	N/A	2018/08/02	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	34	N/A	2018/08/03	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	4	N/A	2018/08/04	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

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Your Project #: 121414998
Site Location: BORDER BEACON

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

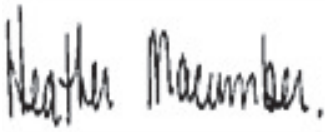
Your C.O.C. #: D 33401, D 33402, d 33403, D 33404, D 33405, D 33406

Report Date: 2018/08/24
Report #: R5371714
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5438
Received: 2018/07/23, 08:52

Encryption Key



Heather Macumber
Senior Project Manager
24 Aug 2018 15:46:21

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHG991	HHG991	HHG992	HHG993			
Sampling Date		2018/07/15	2018/07/15	2018/07/15	2018/07/15			
COC Number		D 33401	D 33401	D 33401	D 33401			
	UNITS	**2018-MW41-GP01**	**2018-MW41-GP01 Lab-Dup**	**2018-MW41-GP02**	**2018-MW41-GP06**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	11	11	22	15	1.0	5649146	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HHG994	HHG996	HHG997	HHG998			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401	D 33401	D 33401	D 33401			
	UNITS	**2018-MW40-GP01**	**2018-MW39-GP01**	**2018-MW39-GP02**	**2018-MW39-GP03**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	17	15	8.8	9.0	1.0	5649146	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHG999	HHH000	HHH005	HHH006			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401	D 33401	D 33402	D 33402			
	UNITS	**2018-MW38-GP01**	**2018-MW38-GP02**	**2018-MW38-GP08**	**2018-MW37-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	4.2	2.1	17	10	1.0	5649146	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHH007	HHH008	HHH009	HHH010			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33402	D 33402	D 33402	D 33402			
	UNITS	**2018-MW37-GP02**	**2018-MW37-GP03**	**2018-MW34-GP01**	**2018-MW34-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	14	14	13	10	1.0	5649146	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHH011	HHH014		HHH030	HHH032			
Sampling Date		2018/07/16	2018/07/16		2018/07/16	2018/07/16			
COC Number		D 33402	D 33402		d 33403	d 33403			
	UNITS	**2018-MW33-GP01**	**2018-BH35-GP06**	**QC Batch**	**2018-BH36-GP01**	**2018-SS07**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	6.2	1.6	5649146	2.7	16	1.0	5646614	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHH033	HHH034	HHH035	HHH035	HHH036	HHH037	HHH038			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		d 33403	d 33403	d 33403	d 33403	d 33403	d 33403	d 33403			
	UNITS	**2018-SS08**	**2018-SS09**	**2018-SS60**	**2018-SS60 Lab-Dup**	**2018-SS10**	**2018-SS11**	**2018-SS12**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	4.3	5.3	16	16	15	5.5	15	1.0	5646614	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HHH039	HHH040	HHH041	HHH042	HHH043	HHH044	HHH045			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		d 33403	D 33404	D 33404	D 33404	D 33404	D 33404	D 33404			
	UNITS	**2018-SS13**	**2018-SS61**	**2018-SS14**	**2018-SS62**	**2018-SS15**	**2018-SS16**	**2018-SS17**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	5.0	4.2	8.5	8.5	5.4	19	3.0	1.0	5646614	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHH046	HHH047	HHH048	HHH049		HHH055	HHH055			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16		2018/07/16	2018/07/16			
COC Number		D 33404	D 33404	D 33404	D 33404		D 33405	D 33405			
	UNITS	**2018-SS18**	**2018-SS19**	**2018-SS63**	**2018-SS20**	**QC Batch**	**2018-SS64**	**2018-SS64 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	4.9	11	11	11	5646614	8.8	9.6	1.0	5647081	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHH056	HHH057	HHH058	HHH059	HHH060		HHH061			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33405	D 33405		D 33405			
	UNITS	**2018-SS21**	**2018-SS65**	**2018-SS22**	**2018-SS66**	**2018-SS23**	**QC Batch**	**2018-SS24**	**RDL**	**QC Batch**	**MDL**
Inorganics											
Moisture	%	10	11	3.4	17	8.5	5647081	5.4	1.0	5647469	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHH062	HHH063	HHH064	HHH070	HHH071	HHH072			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33406	D 33406	D 33406			
	UNITS	**2018-SS25**	**2018-SS26**	**2018-SS27**	**2018-SS28**	**2018-SS67**	**2018-SS29**	**RDL**	**QC Batch**	**MDL**
Inorganics										
Moisture	%	6.9	4.5	1.9	3.2	3.5	2.3	1.0	5647469	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHG992	HHG995	HHG996	HHG998			
Sampling Date		2018/07/15	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401	D 33401	D 33401	D 33401			
	UNITS	**2018-MW41-GP02**	**2018-MW40-GP02**	**2018-MW39-GP01**	**2018-MW39-GP03**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	4800	4300	4000	3200	10	5654311	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Barium (Ba)	mg/kg	40	83	31	46	5.0	5654311	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5654311	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5654311	N/A
Acid Extractable Chromium (Cr)	mg/kg	5.5	8.6	4.8	2.7	2.0	5654311	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.0	4.9	1.9	1.9	1.0	5654311	N/A
Acid Extractable Copper (Cu)	mg/kg	3.8	9.2	4.5	5.2	2.0	5654311	N/A
Acid Extractable Iron (Fe)	mg/kg	10000	15000	10000	9200	50	5654311	N/A
Acid Extractable Lead (Pb)	mg/kg	5.5	5.8	5.5	4.9	0.50	5654311	N/A
Acid Extractable Lithium (Li)	mg/kg	8.4	10	11	9.5	2.0	5654311	N/A
Acid Extractable Manganese (Mn)	mg/kg	98	180	93	140	2.0	5654311	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Nickel (Ni)	mg/kg	2.9	6.8	3.1	2.4	2.0	5654311	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.7	9.0	6.2	5.8	2.0	5654311	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5654311	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5654311	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.2	9.1	<5.0	6.8	5.0	5654311	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Uranium (U)	mg/kg	0.55	1.0	0.61	0.77	0.10	5654311	N/A
Acid Extractable Vanadium (V)	mg/kg	11	19	8.9	6.9	2.0	5654311	N/A
Acid Extractable Zinc (Zn)	mg/kg	32	38	29	24	5.0	5654311	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH000	HHH000	HHH006	HHH009			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401	D 33401	D 33402	D 33402			
	UNITS	**2018-MW38-GP02**	**2018-MW38-GP02 Lab-Dup**	**2018-MW37-GP01**	**2018-MW34-GP01**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3700	3800	5400	3300	10	5654311	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Barium (Ba)	mg/kg	69	72	25	22	5.0	5654311	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5654311	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5654311	N/A
Acid Extractable Chromium (Cr)	mg/kg	4.6	4.4	5.6	3.3	2.0	5654311	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.6	2.8	2.0	1.5	1.0	5654311	N/A
Acid Extractable Copper (Cu)	mg/kg	7.7	7.2	4.5	3.6	2.0	5654311	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	11000	11000	9600	50	5654311	N/A
Acid Extractable Lead (Pb)	mg/kg	5.4	5.0	6.7	5.0	0.50	5654311	N/A
Acid Extractable Lithium (Li)	mg/kg	10	11	10	9.4	2.0	5654311	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	130	91	90	2.0	5654311	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.6	4.1	3.1	<2.0	2.0	5654311	N/A
Acid Extractable Rubidium (Rb)	mg/kg	7.7	7.6	4.8	5.3	2.0	5654311	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5654311	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5654311	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.6	6.4	5.0	<5.0	5.0	5654311	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Uranium (U)	mg/kg	0.90	0.74	0.84	0.60	0.10	5654311	N/A
Acid Extractable Vanadium (V)	mg/kg	8.4	8.4	12	6.7	2.0	5654311	N/A
Acid Extractable Zinc (Zn)	mg/kg	30	31	29	27	5.0	5654311	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH012	HHH013		HHH031			
Sampling Date		2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33402	D 33402		d 33403			
	UNITS	**2018-MW33-GP03**	**2018-BH35-GP01**	**QC Batch**	**2018-BH36-GP02**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3800	6700	5654311	5400	10	5648964	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Barium (Ba)	mg/kg	45	30	5654311	90	5.0	5648964	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	5654311	<50	50	5648964	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	5654311	<0.30	0.30	5648964	N/A
Acid Extractable Chromium (Cr)	mg/kg	3.5	6.6	5654311	7.8	2.0	5648964	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.4	2.0	5654311	3.7	1.0	5648964	N/A
Acid Extractable Copper (Cu)	mg/kg	6.9	3.3	5654311	8.2	2.0	5648964	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	13000	5654311	14000	50	5648964	N/A
Acid Extractable Lead (Pb)	mg/kg	5.6	8.2	5654311	7.0	0.50	5648964	N/A
Acid Extractable Lithium (Li)	mg/kg	11	9.9	5654311	12	2.0	5648964	N/A
Acid Extractable Manganese (Mn)	mg/kg	190	110	5654311	160	2.0	5648964	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	5654311	<0.10	0.10	5648964	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.1	3.2	5654311	6.2	2.0	5648964	N/A
Acid Extractable Rubidium (Rb)	mg/kg	5.7	7.1	5654311	9.3	2.0	5648964	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	5654311	<1.0	1.0	5648964	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	5654311	<0.50	0.50	5648964	N/A
Acid Extractable Strontium (Sr)	mg/kg	5.2	6.9	5654311	7.8	5.0	5648964	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	5654311	<0.10	0.10	5648964	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	5654311	<2.0	2.0	5648964	N/A
Acid Extractable Uranium (U)	mg/kg	0.85	0.64	5654311	0.82	0.10	5648964	N/A
Acid Extractable Vanadium (V)	mg/kg	6.6	14	5654311	14	2.0	5648964	N/A
Acid Extractable Zinc (Zn)	mg/kg	41	26	5654311	38	5.0	5648964	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH031		HHH034	HHH034		HHH035			
Sampling Date		2018/07/16		2018/07/16	2018/07/16		2018/07/16			
COC Number		d 33403		d 33403	d 33403		d 33403			
	UNITS	**2018-BH36-GP02 Lab-Dup**	**QC Batch**	**2018-SS09**	**2018-SS09 Lab-Dup**	**QC Batch**	**2018-SS60**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	4800	5648964	6000	5500	5651135	5500	10	5651141	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Barium (Ba)	mg/kg	85	5648964	36	41	5651135	35	5.0	5651141	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Boron (B)	mg/kg	<50	5648964	<50	<50	5651135	<50	50	5651141	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	5648964	0.52	0.46	5651135	0.65	0.30	5651141	N/A
Acid Extractable Chromium (Cr)	mg/kg	7.2	5648964	8.6	5.8	5651135	6.1	2.0	5651141	N/A
Acid Extractable Cobalt (Co)	mg/kg	3.4	5648964	2.3	2.4	5651135	2.5	1.0	5651141	N/A
Acid Extractable Copper (Cu)	mg/kg	7.2	5648964	5.5	5.4	5651135	6.4	2.0	5651141	N/A
Acid Extractable Iron (Fe)	mg/kg	13000	5648964	12000	12000	5651135	12000	50	5651141	N/A
Acid Extractable Lead (Pb)	mg/kg	6.8	5648964	24	16 (1)	5651135	16	0.50	5651141	N/A
Acid Extractable Lithium (Li)	mg/kg	12	5648964	10	9.4	5651135	9.9	2.0	5651141	N/A
Acid Extractable Manganese (Mn)	mg/kg	150	5648964	120	110	5651135	120	2.0	5651141	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	5648964	0.16	0.16	5651135	0.23	0.10	5651141	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Nickel (Ni)	mg/kg	4.7	5648964	3.3	3.3	5651135	4.2	2.0	5651141	N/A
Acid Extractable Rubidium (Rb)	mg/kg	9.2	5648964	7.2	6.7	5651135	5.2	2.0	5651141	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	5648964	<1.0	<1.0	5651135	<1.0	1.0	5651141	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	5648964	<0.50	<0.50	5651135	<0.50	0.50	5651141	N/A
Acid Extractable Strontium (Sr)	mg/kg	7.1	5648964	14	15	5651135	15	5.0	5651141	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	5648964	<0.10	<0.10	5651135	<0.10	0.10	5651141	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	5648964	<2.0	<2.0	5651135	<2.0	2.0	5651141	N/A
Acid Extractable Uranium (U)	mg/kg	0.80	5648964	0.63	0.67	5651135	0.62	0.10	5651141	N/A
Acid Extractable Vanadium (V)	mg/kg	9.7	5648964	14	12	5651135	12	2.0	5651141	N/A
Acid Extractable Zinc (Zn)	mg/kg	38	5648964	44	42	5651135	47	5.0	5651141	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Poor RPD due to sample inhomogeneity. < 10 % of compounds in multi-component analysis in violation.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH036	HHH037	HHH041	HHH042	HHH046	HHH049			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		d 33403	d 33403	D 33404	D 33404	D 33404	D 33404			
	UNITS	**2018-SS10**	**2018-SS11**	**2018-SS14**	**2018-SS62**	**2018-SS18**	**2018-SS20**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	5700	5000	7000	6100	5700	5600	10	5651141	N/A
Acid Extractable Antimony (Sb)	mg/kg	5.0	12	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Arsenic (As)	mg/kg	4.8	3.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Barium (Ba)	mg/kg	55	45	30	33	71	18	5.0	5651141	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	<50	50	5651141	N/A
Acid Extractable Cadmium (Cd)	mg/kg	0.95	0.45	<0.30	<0.30	0.48	<0.30	0.30	5651141	N/A
Acid Extractable Chromium (Cr)	mg/kg	15	9.8	8.6	7.4	8.2	3.6	2.0	5651141	N/A
Acid Extractable Cobalt (Co)	mg/kg	3.9	3.2	2.0	1.9	2.4	1.2	1.0	5651141	N/A
Acid Extractable Copper (Cu)	mg/kg	18	610	7.0	8.2	9.2	2.0	2.0	5651141	N/A
Acid Extractable Iron (Fe)	mg/kg	15000	11000	14000	12000	13000	10000	50	5651141	N/A
Acid Extractable Lead (Pb)	mg/kg	180	180	17	20	94	6.1	0.50	5651141	N/A
Acid Extractable Lithium (Li)	mg/kg	10	10	8.4	8.1	8.8	7.6	2.0	5651141	N/A
Acid Extractable Manganese (Mn)	mg/kg	150	130	110	95	110	74	2.0	5651141	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651141	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Nickel (Ni)	mg/kg	11	4.4	3.4	2.9	3.8	2.1	2.0	5651141	N/A
Acid Extractable Rubidium (Rb)	mg/kg	6.1	5.9	4.8	5.3	5.2	4.0	2.0	5651141	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651141	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5651141	N/A
Acid Extractable Strontium (Sr)	mg/kg	40	22	6.5	6.3	6.6	<5.0	5.0	5651141	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651141	N/A
Acid Extractable Tin (Sn)	mg/kg	2.2	3.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Uranium (U)	mg/kg	0.67	0.61	0.54	0.53	0.62	0.40	0.10	5651141	N/A
Acid Extractable Vanadium (V)	mg/kg	25	14	15	13	14	9.7	2.0	5651141	N/A
Acid Extractable Zinc (Zn)	mg/kg	93	120	43	38	360	18	5.0	5651141	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH055	HHH056	HHH057	HHH058	HHH059	HHH060			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33405	D 33405	D 33405			
	UNITS	**2018-SS64**	**2018-SS21**	**2018-SS65**	**2018-SS22**	**2018-SS66**	**2018-SS23**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	6200	3500	5400	5700	8000	6100	10	5651141	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Barium (Ba)	mg/kg	23	21	23	34	31	32	5.0	5651141	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	<50	50	5651141	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	5651141	N/A
Acid Extractable Chromium (Cr)	mg/kg	4.8	2.7	4.0	10	8.6	6.9	2.0	5651141	N/A
Acid Extractable Cobalt (Co)	mg/kg	1.3	<1.0	1.1	3.6	3.5	2.5	1.0	5651141	N/A
Acid Extractable Copper (Cu)	mg/kg	2.4	<2.0	<2.0	56	11	3.8	2.0	5651141	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	6400	9100	17000	17000	13000	50	5651141	N/A
Acid Extractable Lead (Pb)	mg/kg	6.9	5.3	6.1	8.7	9.8	7.2	0.50	5651141	N/A
Acid Extractable Lithium (Li)	mg/kg	8.0	3.8	5.8	10	11	9.5	2.0	5651141	N/A
Acid Extractable Manganese (Mn)	mg/kg	75	38	57	140	140	110	2.0	5651141	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651141	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Nickel (Ni)	mg/kg	2.1	<2.0	<2.0	5.1	6.4	3.4	2.0	5651141	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.1	3.0	3.9	6.0	6.8	5.5	2.0	5651141	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651141	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5651141	N/A
Acid Extractable Strontium (Sr)	mg/kg	<5.0	<5.0	5.4	6.7	6.3	5.1	5.0	5651141	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651141	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651141	N/A
Acid Extractable Uranium (U)	mg/kg	0.52	0.24	0.32	0.71	0.85	0.60	0.10	5651141	N/A
Acid Extractable Vanadium (V)	mg/kg	11	6.5	11	21	19	15	2.0	5651141	N/A
Acid Extractable Zinc (Zn)	mg/kg	20	10	15	98	57	27	5.0	5651141	N/A

RDL = Reportable Detection Limit
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N/A = Not Applicable

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH061	HHH062	HHH063	HHH064		HHH070			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33405		D 33406			
	UNITS	**2018-SS24**	**2018-SS25**	**2018-SS26**	**2018-SS27**	**QC Batch**	**2018-SS28**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	5500	7300	4700	3200	5651141	5900	10	5654311	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Barium (Ba)	mg/kg	29	24	23	20	5651141	29	5.0	5654311	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	5651141	<50	50	5654311	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	5651141	<0.30	0.30	5654311	N/A
Acid Extractable Chromium (Cr)	mg/kg	5.2	9.5	3.6	2.6	5651141	6.8	2.0	5654311	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.2	2.0	1.8	1.5	5651141	2.9	1.0	5654311	N/A
Acid Extractable Copper (Cu)	mg/kg	4.6	9.1	3.2	3.9	5651141	6.9	2.0	5654311	N/A
Acid Extractable Iron (Fe)	mg/kg	10000	15000	8400	6700	5651141	12000	50	5654311	N/A
Acid Extractable Lead (Pb)	mg/kg	5.6	8.3	6.2	5.2	5651141	8.0	0.50	5654311	N/A
Acid Extractable Lithium (Li)	mg/kg	9.8	7.1	7.4	8.9	5651141	11	2.0	5654311	N/A
Acid Extractable Manganese (Mn)	mg/kg	110	100	81	85	5651141	150	2.0	5654311	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	5651141	<0.10	0.10	5654311	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.7	3.5	3.0	2.1	5651141	4.2	2.0	5654311	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.4	5.3	4.2	3.5	5651141	6.5	2.0	5654311	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	5651141	<1.0	1.0	5654311	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	5651141	<0.50	0.50	5654311	N/A
Acid Extractable Strontium (Sr)	mg/kg	5.8	5.9	<5.0	<5.0	5651141	6.7	5.0	5654311	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	5651141	<0.10	0.10	5654311	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	5651141	<2.0	2.0	5654311	N/A
Acid Extractable Uranium (U)	mg/kg	0.57	0.52	0.47	0.53	5651141	0.70	0.10	5654311	N/A
Acid Extractable Vanadium (V)	mg/kg	11	22	7.3	5.1	5651141	12	2.0	5654311	N/A
Acid Extractable Zinc (Zn)	mg/kg	26	22	18	22	5651141	30	5.0	5654311	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH071	HHH072			
Sampling Date		2018/07/16	2018/07/16			
COC Number		D 33406	D 33406			
	UNITS	**2018-SS67**	**2018-SS29**	**RDL**	**QC Batch**	**MDL**
Metals						
Acid Extractable Aluminum (Al)	mg/kg	5900	3800	10	5654311	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Barium (Ba)	mg/kg	29	30	5.0	5654311	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	50	5654311	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	0.30	5654311	N/A
Acid Extractable Chromium (Cr)	mg/kg	5.2	3.7	2.0	5654311	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.6	2.1	1.0	5654311	N/A
Acid Extractable Copper (Cu)	mg/kg	5.3	6.6	2.0	5654311	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	8900	50	5654311	N/A
Acid Extractable Lead (Pb)	mg/kg	8.4	6.1	0.50	5654311	N/A
Acid Extractable Lithium (Li)	mg/kg	11	10	2.0	5654311	N/A
Acid Extractable Manganese (Mn)	mg/kg	140	110	2.0	5654311	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.9	3.4	2.0	5654311	N/A
Acid Extractable Rubidium (Rb)	mg/kg	5.3	6.3	2.0	5654311	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	1.0	5654311	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	0.50	5654311	N/A
Acid Extractable Strontium (Sr)	mg/kg	5.2	<5.0	5.0	5654311	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	0.10	5654311	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	2.0	5654311	N/A
Acid Extractable Uranium (U)	mg/kg	0.65	0.71	0.10	5654311	N/A
Acid Extractable Vanadium (V)	mg/kg	11	6.8	2.0	5654311	N/A
Acid Extractable Zinc (Zn)	mg/kg	30	26	5.0	5654311	N/A

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHG992		HHG997	HHG999	HHH008			
Sampling Date		2018/07/15		2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401		D 33401	D 33401	D 33402			
	UNITS	**2018-MW41-GP02**	**RDL**	**2018-MW39-GP02**	**2018-MW38-GP01**	**2018-MW37-GP03**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	0.25	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
2-Methylnaphthalene	mg/kg	0.30	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Acenaphthene	mg/kg	0.017	0.010	<0.020 (1)	<0.020 (1)	<0.020 (1)	0.020	5655266	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Fluorene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Naphthalene	mg/kg	<0.040 (1)	0.040	<0.010	<0.010	<0.010	0.010	5655266	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5655266	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	97		103	96	100		5655266	
D14-Terphenyl (FS)	%	116		104	107	106		5655266	
D8-Acenaphthylene	%	99		95	99	91		5655266	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH010	HHH011			HHH030	HHH032			
Sampling Date		2018/07/16	2018/07/16			2018/07/16	2018/07/16			
COC Number		D 33402	D 33402			d 33403	d 33403			
	UNITS	**2018-MW34-GP02**	**2018-MW33-GP01**	**RDL**	**QC Batch**	**2018-BH36-GP01**	**2018-SS07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Acenaphthene	mg/kg	<0.020 (1)	<0.020 (1)	0.020	5655266	<0.010	<0.010	0.010	5648754	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Anthracene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	0.020	5644065	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Chrysene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Fluoranthene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Fluorene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Naphthalene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Perylene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Phenanthrene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Pyrene	mg/kg	<0.010	<0.010	0.010	5655266	<0.010	<0.010	0.010	5648754	N/A
Surrogate Recovery (%)										
D10-Anthracene	%	90	91		5655266	99	84		5648754	
D14-Terphenyl (FS)	%	101	112		5655266	105	98		5648754	
D8-Acenaphthylene	%	91	101		5655266	96	90		5648754	

RDL = Reportable Detection Limit
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N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH039		HHH040		HHH043		HHH046	HHH047			
Sampling Date		2018/07/16		2018/07/16		2018/07/16		2018/07/16	2018/07/16			
COC Number		d 33403		D 33404		D 33404		D 33404	D 33404			
	UNITS	**2018-SS13**	**RDL**	**2018-SS61**	**RDL**	**2018-SS15**	**QC Batch**	**2018-SS18**	**2018-SS19**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons												
1-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Acenaphthene	mg/kg	<0.010	0.010	<0.020 (1)	0.020	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Acenaphthylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	0.020	<0.020	5644065	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Fluorene	mg/kg	<0.010	0.010	<0.020 (1)	0.020	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Naphthalene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	0.010	<0.010	5648754	<0.010	<0.010	0.010	5648960	N/A
Surrogate Recovery (%)												
D10-Anthracene	%	106		98		80	5648754	97	99		5648960	
D14-Terphenyl (FS)	%	105		97		108	5648754	100	97		5648960	
D8-Acenaphthylene	%	100		88		95	5648754	102	100		5648960	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH048	HHH049	HHH055				HHH055			
Sampling Date		2018/07/16	2018/07/16	2018/07/16				2018/07/16			
COC Number		D 33404	D 33404	D 33405				D 33405			
	UNITS	**2018-SS63**	**2018-SS20**	**2018-SS64**	**RDL**	**QC Batch**	**MDL**	**2018-SS64 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Acenaphthene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	0.020	5644065	N/A				
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Chrysene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Fluorene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Naphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Phenanthrene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5648960	N/A	<0.010	0.010	5648960	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	95	98	93		5648960		79		5648960	
D14-Terphenyl (FS)	%	97	96	96		5648960		78		5648960	
D8-Acenaphthylene	%	100	98	94		5648960		92		5648960	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH056	HHH057	HHH058	HHH059	HHH061	HHH063			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33405	D 33405	D 33405			
	UNITS	**2018-SS21**	**2018-SS65**	**2018-SS22**	**2018-SS66**	**2018-SS24**	**2018-SS26**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Acenaphthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Chrysene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Fluoranthene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Fluorene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Naphthalene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Perylene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Phenanthrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Pyrene	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	5648960	N/A
Surrogate Recovery (%)										
D10-Anthracene	%	94	99	97	99	98	99		5648960	
D14-Terphenyl (FS)	%	96	99	97	98	99	104		5648960	
D8-Acenaphthylene	%	99	99	96	96	97	102		5648960	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH070	HHH071			
Sampling Date		2018/07/16	2018/07/16			
COC Number		D 33406	D 33406			
	UNITS	**2018-SS28**	**2018-SS67**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons						
1-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Acenaphthene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Anthracene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Chrysene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Fluoranthene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Fluorene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Naphthalene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Perylene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Phenanthrene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Pyrene	mg/kg	<0.010	<0.010	0.010	5648960	N/A
Surrogate Recovery (%)						
D10-Anthracene	%	101	97		5648960	
D14-Terphenyl (FS)	%	98	100		5648960	
D8-Acenaphthylene	%	97	97		5648960	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHG991				HHG993	HHG994			
Sampling Date		2018/07/15				2018/07/15	2018/07/16			
COC Number		D 33401				D 33401	D 33401			
	UNITS	**2018-MW41-GP01**	**RDL**	**QC Batch**	**MDL**	**2018-MW41-GP06**	**2018-MW40-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	0.025	5658687	0.010	<0.025	<0.025	0.025	5661393	0.010
Toluene	mg/kg	0.051	0.025	5658687	0.010	<0.025	<0.025	0.025	5661393	0.010
Ethylbenzene	mg/kg	<0.025	0.025	5658687	0.010	<0.025	<0.025	0.025	5661393	0.025
Total Xylenes	mg/kg	0.082	0.050	5658687	0.010	<0.050	<0.050	0.050	5661393	N/A
Aliphatic >C6-C8	mg/kg	<1.0	1.0	5658687	0.020					
Aliphatic >C8-C10	mg/kg	730 (1)	10	5658687	0.080					
C6 - C10 (less BTEX)	mg/kg					<2.5	<2.5	2.5	5661393	N/A
>C10-C16 Hydrocarbons	mg/kg					<10	<10	10	5652412	N/A
>C8-C10 Aromatics (-EX)	mg/kg	6.2	0.50	5658687	0.020					
>C16-C21 Hydrocarbons	mg/kg					<10	<10	10	5652412	N/A
Aliphatic >C10-C12	mg/kg	510	8.0	5648896	1.6					
Aliphatic >C12-C16	mg/kg	38	15	5648896	3.0					
>C21-<C32 Hydrocarbons	mg/kg					<15	<15	15	5652412	N/A
Aliphatic >C16-C21	mg/kg	290	15	5648896	3.0					
Aliphatic >C21-<C32	mg/kg	2200	15	5648896	3.0					
Modified TPH (Tier1)	mg/kg					<15	<15	15	5644427	N/A
Aromatic >C10-C12	mg/kg	55	4.0	5648896	0.80					
Reached Baseline at C32	mg/kg	No	N/A	5648896	N/A	NA	NA	N/A	5652412	N/A
Aromatic >C12-C16	mg/kg	23	15	5648896	3.0					
Hydrocarbon Resemblance	mg/kg	COMMENT (2)	N/A	5648896	N/A	NA	NA	N/A	5652412	N/A
Aromatic >C16-C21	mg/kg	39	15	5648896	3.0					
Aromatic >C21-<C32	mg/kg	360	15	5648896	3.0					
Modified TPH (Tier 2)	mg/kg	4200	15	5644334	3.0					
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	82		5648896						
n-Dotriacontane - Extractable	%	80		5648896						
Isobutylbenzene - Extractable	%					100	103		5652412	
n-Dotriacontane - Extractable	%					104	103		5652412	
Isobutylbenzene - Volatile	%	67		5658687						
Isobutylbenzene - Volatile	%					111	107		5661393	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) One product in the gas/fuel oil range. Lube oil fraction.

Maxxam Job #: B8I5438
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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHG996	HHG998		HHH000			
Sampling Date		2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33401	D 33401		D 33401			
	UNITS	**2018-MW39-GP01**	**2018-MW39-GP03**	**QC Batch**	**2018-MW38-GP02**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.010
Toluene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.010
Ethylbenzene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.025
Total Xylenes	mg/kg	<0.050	<0.050	5661393	<0.050	0.050	5661393	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	5661393	<2.5	2.5	5661393	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	5652412	<10	10	5652412	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	5652412	<10	10	5652412	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	5652412	<15	15	5652412	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	5644427	<15	15	5644592	N/A
Reached Baseline at C32	mg/kg	NA	NA	5652412	NA	N/A	5652412	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	5652412	NA	N/A	5652412	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	101	100	5652412	105		5652412	
n-Dotriacontane - Extractable	%	101	103	5652412	107		5652412	
Isobutylbenzene - Volatile	%	114	99	5661393	113		5661393	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH005	HHH006		HHH009			
Sampling Date		2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33402	D 33402		D 33402			
	UNITS	**2018-MW38-GP08**	**2018-MW37-GP01**	**QC Batch**	**2018-MW34-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.010
Toluene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.010
Ethylbenzene	mg/kg	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.025
Total Xylenes	mg/kg	<0.050	<0.050	5661393	<0.050	0.050	5661393	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	5661393	<2.5	2.5	5661393	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	5652412	<10	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	5652412	<10	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	5652412	<15	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	5644592	<15	15	5644592	N/A
Reached Baseline at C32	mg/kg	NA	NA	5652412	NA	N/A	5654207	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	5652412	NA	N/A	5654207	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	101	102	5652412	99		5654207	
n-Dotriacontane - Extractable	%	99	104 (1)	5652412	96		5654207	
Isobutylbenzene - Volatile	%	102	106 (2)	5661393	121 (2)		5661393	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Site Location: BORDER BEACON
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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH011	HHH014				HHH014			
Sampling Date		2018/07/16	2018/07/16				2018/07/16			
COC Number		D 33402	D 33402				D 33402			
	UNITS	**2018-MW33-GP01**	**2018-BH35-GP06**	**RDL**	**QC Batch**	**MDL**	**2018-BH35-GP06 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	0.025	5661393	0.010				
Toluene	mg/kg	<0.025	<0.025	0.025	5661393	0.010				
Ethylbenzene	mg/kg	<0.025	<0.025	0.025	5661393	0.025				
Total Xylenes	mg/kg	<0.050	<0.050	0.050	5661393	N/A				
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	2.5	5661393	N/A				
>C10-C16 Hydrocarbons	mg/kg	<10	<10	10	5654207	N/A	<10	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	10	5654207	N/A	<10	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	15	5654207	N/A	<15	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	15	5644592	N/A				
Reached Baseline at C32	mg/kg	NA	NA	N/A	5654207	N/A				
Hydrocarbon Resemblance	mg/kg	NA	NA	N/A	5654207	N/A				
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	97	99		5654207		97		5654207	
n-Dotriacontane - Extractable	%	97	103		5654207		99		5654207	
Isobutylbenzene - Volatile	%	107	94		5661393					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH030	HHH032	HHH033		HHH034			
Sampling Date		2018/07/16	2018/07/16	2018/07/16		2018/07/16			
COC Number		d 33403	d 33403	d 33403		d 33403			
	UNITS	**2018-BH36-GP01**	**2018-SS07**	**2018-SS08**	**QC Batch**	**2018-SS09**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5661393	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5661393	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5661393	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	5661393	<0.050	0.050	5661393	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	5661393	<2.5	2.5	5661393	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	5654207	<10	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	5654207	<10	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	5654207	24	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	<15	5644592	24	15	5644427	N/A
Reached Baseline at C32	mg/kg	NA	NA	NA	5654207	Yes	N/A	5654207	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	NA	5654207	COMMENT (1)	N/A	5654207	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	105	98	102	5654207	97		5654207	
n-Dotriacontane - Extractable	%	104 (2)	101	104	5654207	99		5654207	
Isobutylbenzene - Volatile	%	102 (3)	105	108 (3)	5661393	107		5661393	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Possible lube oil fraction. Unidentified compound(s) in lube oil range.
(2) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH035	HHH036	HHH037		HHH038			
Sampling Date		2018/07/16	2018/07/16	2018/07/16		2018/07/16			
COC Number		d 33403	d 33403	d 33403		d 33403			
	UNITS	**2018-SS60**	**2018-SS10**	**2018-SS11**	**QC Batch**	**2018-SS12**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5663012	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	5661393	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	5661393	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	5661393	<2.5	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	23	5654207	50	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	72	5654207	61	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	19	<15	32	5654207	290	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	19	<15	130	5644427	400	15	5644592	N/A
Reached Baseline at C32	mg/kg	Yes	NA	Yes	5654207	No	N/A	5654207	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	NA	COMMENT (2)	5654207	COMMENT (3)	N/A	5654207	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	103	97	96	5654207	97		5654207	
n-Dotriacontane - Extractable	%	105	103	98 (4)	5654207	95 (4)		5654207	
Isobutylbenzene - Volatile	%	110 (5)	131 (6)	91 (5)	5661393	109 (5)		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Possible lube oil fraction.
(2) One product in fuel / lube range.
(3) One product in fuel oil range. Lube oil fraction.
(4) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(6) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH038				HHH039		HHH040			
Sampling Date		2018/07/16				2018/07/16		2018/07/16			
COC Number		d 33403				d 33403		D 33404			
	UNITS	**2018-SS12 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SS13**	**QC Batch**	**2018-SS61**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons											
Benzene	mg/kg	<0.025	0.025	5663012	N/A	<0.025	5663012	<0.025	0.025	5663012	N/A
Toluene	mg/kg	<0.025	0.025	5663012	N/A	<0.025	5663012	<0.025	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5663012	0.025	<0.025	5663012	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	0.050	5663012	N/A	<0.050	5663012	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5663012	N/A	5.8	5663012	5.9	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg					150	5654207	700	10	5655035	N/A
>C16-C21 Hydrocarbons	mg/kg					74	5654207	270	10	5655035	N/A
>C21-<C32 Hydrocarbons	mg/kg					71	5654207	76	15	5655035	N/A
Modified TPH (Tier1)	mg/kg					300	5644592	1100	15	5644592	N/A
Reached Baseline at C32	mg/kg					Yes	5654207	Yes	N/A	5655035	N/A
Hydrocarbon Resemblance	mg/kg					COMMENT (1)	5654207	COMMENT (2)	N/A	5655035	N/A
Surrogate Recovery (%)											
Isobutylbenzene - Extractable	%					103	5654207	119		5655035	
n-Dotriacontane - Extractable	%					112	5654207	115		5655035	
Isobutylbenzene - Volatile	%	103 (3)		5663012		97	5663012	97 (3)		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Weathered fuel oil fraction. Lube oil fraction.
(2) Weathered fuel oil fraction.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH041	HHH042		HHH043	HHH044			
Sampling Date		2018/07/16	2018/07/16		2018/07/16	2018/07/16			
COC Number		D 33404	D 33404		D 33404	D 33404			
	UNITS	**2018-SS14**	**2018-SS62**	**QC Batch**	**2018-SS15**	**2018-SS16**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	<0.025	5663012	<0.025	<0.025	0.025	5663012	N/A
Toluene	mg/kg	<0.025	<0.025	5663012	<0.025	<0.025	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	5663012	<0.025	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	<0.050	5663012	<0.050	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	39	28	5663012	<2.5	<2.5	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg	2500	2000	5654207	200	19	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	430	370	5654207	24	24	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	220	210	5654207	82	220	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	3200	2600	5644427	300	260	15	5644592	N/A
Reached Baseline at C32	mg/kg	Yes	Yes	5654207	Yes	No	N/A	5654207	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (1)	5654207	COMMENT (1)	COMMENT (2)	N/A	5654207	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	104	102	5654207	104	97		5654207	
n-Dotriacontane - Extractable	%	96	97	5654207	95 (3)	96		5654207	
Isobutylbenzene - Volatile	%	77	84 (4)	5663012	99	126		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Weathered fuel oil fraction. Lube oil fraction.
(2) One product in fuel oil range. Lube oil fraction.
(3) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH045		HHH046		HHH047			
Sampling Date		2018/07/16		2018/07/16		2018/07/16			
COC Number		D 33404		D 33404		D 33404			
	UNITS	**2018-SS17**	**QC Batch**	**2018-SS18**	**QC Batch**	**2018-SS19**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	5663012	<0.025	5663012	<0.025	0.025	5663012	N/A
Toluene	mg/kg	<0.025	5663012	<0.025	5663012	<0.025	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	5663012	<0.025	5663012	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	5663012	<0.050	5663012	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	12	5663012	<2.5	5663012	<2.5	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg	550	5654207	75	5654207	<10	10	5654207	N/A
>C16-C21 Hydrocarbons	mg/kg	38	5654207	40	5654207	<10	10	5654207	N/A
>C21-<C32 Hydrocarbons	mg/kg	22	5654207	89	5654207	27	15	5654207	N/A
Modified TPH (Tier1)	mg/kg	620	5644592	200	5644427	27	15	5644592	N/A
Reached Baseline at C32	mg/kg	Yes	5654207	Yes	5654207	Yes	N/A	5654207	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	5654207	COMMENT (2)	5654207	COMMENT (3)	N/A	5654207	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	103	5654207	100	5654207	98		5654207	
n-Dotriacontane - Extractable	%	98	5654207	96	5654207	97		5654207	
Isobutylbenzene - Volatile	%	107	5663012	101	5663012	105		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) One product in fuel oil range. Lube oil fraction.
(3) Possible lube oil fraction. Unidentified compound(s) in lube oil range.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH048		HHH049	HHH055	HHH056			
Sampling Date		2018/07/16		2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33404		D 33404	D 33405	D 33405			
	UNITS	**2018-SS63**	**QC Batch**	**2018-SS20**	**2018-SS64**	**2018-SS21**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	5663012	<0.025	<0.025	<0.025	0.025	5663012	N/A
Toluene	mg/kg	<0.025	5663012	0.043	<0.025	0.072	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	5663012	<0.025	<0.025	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	5663012	<0.050	<0.050	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	5663012	<2.5	<2.5	<2.5	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	5654207	<10	<10	<10	10	5654209	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	5654207	<10	<10	<10	10	5654209	N/A
>C21-<C32 Hydrocarbons	mg/kg	30	5654207	<15	<15	26	15	5654209	N/A
Modified TPH (Tier1)	mg/kg	30	5644592	<15	<15	26	15	5644427	N/A
Reached Baseline at C32	mg/kg	Yes	5654207	NA	NA	Yes	N/A	5654209	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	5654207	NA	NA	COMMENT (1)	N/A	5654209	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	96	5654207	95	95	96		5654209	
n-Dotriacontane - Extractable	%	95	5654207	106	107	107		5654209	
Isobutylbenzene - Volatile	%	122 (2)	5663012	128 (2)	106	119		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range.
(2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH057	HHH058	HHH059	HHH060	HHH061	HHH062			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33405	D 33405	D 33405	D 33405	D 33405	D 33405			
	UNITS	**2018-SS65**	**2018-SS22**	**2018-SS66**	**2018-SS23**	**2018-SS24**	**2018-SS25**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5663012	N/A
Toluene	mg/kg	0.044	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5663012	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.025	5663012	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5663012	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.5	5663012	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	<10	<10	<10	10	5654209	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	<10	<10	10	5654209	N/A
>C21-<C32 Hydrocarbons	mg/kg	20	<15	<15	<15	<15	<15	15	5654209	N/A
Modified TPH (Tier1)	mg/kg	20	<15	<15	<15	<15	<15	15	5644427	N/A
Reached Baseline at C32	mg/kg	Yes	NA	NA	NA	NA	NA	N/A	5654209	N/A
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	NA	NA	NA	NA	NA	N/A	5654209	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	96	95	94	94	88	91		5654209	
n-Dotriacontane - Extractable	%	106	108 (2)	112	106 (2)	101	104 (2)		5654209	
Isobutylbenzene - Volatile	%	106	120 (3)	142 (4)	102 (3)	125 (3)	133 (5)		5663012	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range.
(2) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(4) VPH surrogate not within acceptance limits. Analysis was repeated with similar results.
(5) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. VPH surrogate not within acceptance limits. Analysis was repeated with similar results.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH063				HHH063				HHH064			
Sampling Date		2018/07/16				2018/07/16				2018/07/16			
COC Number		D 33405				D 33405				D 33405			
	UNITS	**2018-SS26**	**RDL**	**QC Batch**	**MDL**	**2018-SS26 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SS27**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons													
Benzene	mg/kg	<0.025	0.025	5663041	N/A	<0.025	0.025	5663041	N/A	<0.025	0.025	5663041	N/A
Toluene	mg/kg	<0.025	0.025	5663041	N/A	<0.025	0.025	5663041	N/A	<0.025	0.025	5663041	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5663041	0.025	<0.025	0.025	5663041	0.025	<0.025	0.025	5663041	0.025
Total Xylenes	mg/kg	<0.050	0.050	5663041	N/A	<0.050	0.050	5663041	N/A	<0.050	0.050	5663041	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5663041	N/A	<2.5	2.5	5663041	N/A	<2.5	2.5	5663041	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5654209	N/A					<10	10	5654209	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5654209	N/A					<10	10	5654209	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5654209	N/A					<15	15	5654209	N/A
Modified TPH (Tier1)	mg/kg	<15	15	5644427	N/A					<15	15	5644427	N/A
Reached Baseline at C32	mg/kg	NA	N/A	5654209	N/A					NA	N/A	5654209	N/A
Hydrocarbon Resemblance	mg/kg	NA	N/A	5654209	N/A					NA	N/A	5654209	N/A
Surrogate Recovery (%)													
Isobutylbenzene - Extractable	%	95		5654209						94		5654209	
n-Dotriacontane - Extractable	%	110		5654209						114 (1)		5654209	
Isobutylbenzene - Volatile	%	118		5663041		116		5663041		128		5663041	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH070				HHH070				HHH071			
Sampling Date		2018/07/16				2018/07/16				2018/07/16			
COC Number		D 33406				D 33406				D 33406			
	UNITS	**2018-SS28**	**RDL**	**QC Batch**	**MDL**	**2018-SS28 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-SS67**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons													
Benzene	mg/kg	<0.025	0.025	5663041	N/A					<0.025	0.025	5663041	N/A
Toluene	mg/kg	<0.025	0.025	5663041	N/A					<0.025	0.025	5663041	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5663041	0.025					<0.025	0.025	5663041	0.025
Total Xylenes	mg/kg	<0.050	0.050	5663041	N/A					<0.050	0.050	5663041	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5663041	N/A					<2.5	2.5	5663041	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5654203	N/A	<10	10	5654203	N/A	<10	10	5654209	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5654203	N/A	<10	10	5654203	N/A	<10	10	5654209	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5654203	N/A	<15	15	5654203	N/A	<15	15	5654209	N/A
Modified TPH (Tier1)	mg/kg	<15	15	5644427	N/A					<15	15	5644427	N/A
Reached Baseline at C32	mg/kg	NA	N/A	5654203	N/A					NA	N/A	5654209	N/A
Hydrocarbon Resemblance	mg/kg	NA	N/A	5654203	N/A					NA	N/A	5654209	N/A
Surrogate Recovery (%)													
Isobutylbenzene - Extractable	%	96		5654203		91		5654203		92		5654209	
n-Dotriacontane - Extractable	%	104		5654203		99		5654203		107		5654209	
Isobutylbenzene - Volatile	%	111 (1)		5663041						109 (1)		5663041	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH072			
Sampling Date		2018/07/16			
COC Number		D 33406			
	UNITS	**2018-SS29**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons					
Benzene	mg/kg	<0.025	0.025	5663041	N/A
Toluene	mg/kg	<0.025	0.025	5663041	N/A
Ethylbenzene	mg/kg	<0.025	0.025	5663041	0.025
Total Xylenes	mg/kg	<0.050	0.050	5663041	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	2.5	5663041	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	10	5654209	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	10	5654209	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5654209	N/A
Modified TPH (Tier1)	mg/kg	<15	15	5644427	N/A
Reached Baseline at C32	mg/kg	NA	N/A	5654209	N/A
Hydrocarbon Resemblance	mg/kg	NA	N/A	5654209	N/A
Surrogate Recovery (%)					
Isobutylbenzene - Extractable	%	95		5654209	
n-Dotriacontane - Extractable	%	114		5654209	
Isobutylbenzene - Volatile	%	110 (1)		5663041	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HHG994	HHG997	HHG999	HHH007			
Sampling Date		2018/07/16	2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33401	D 33401	D 33401	D 33402			
	UNITS	**2018-MW40-GP01**	**2018-MW39-GP02**	**2018-MW38-GP01**	**2018-MW37-GP02**	**RDL**	**QC Batch**	**MDL**
PCBs								
Aroclor 1016	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1221	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1232	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1248	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1242	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1254	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Aroclor 1260	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5649662	N/A
Calculated Total PCB	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	5644326	N/A
Surrogate Recovery (%)								
Decachlorobiphenyl	%	82	84	86	86		5649662	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		HHH011	HHH032		HHH041	HHH042	HHH060			
Sampling Date		2018/07/16	2018/07/16		2018/07/16	2018/07/16	2018/07/16			
COC Number		D 33402	d 33403		D 33404	D 33404	D 33405			
	UNITS	**2018-MW33-GP01**	**2018-SS07**	**QC Batch**	**2018-SS14**	**2018-SS62**	**2018-SS23**	**RDL**	**QC Batch**	**MDL**
PCBs										
Aroclor 1016	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Aroclor 1221	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Aroclor 1232	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Aroclor 1248	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Aroclor 1242	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Aroclor 1254	ug/g	<0.050	<0.050	5649662	0.36	0.38	<0.050	0.050	5652352	N/A
Aroclor 1260	ug/g	<0.050	<0.050	5649662	<0.050	<0.050	<0.050	0.050	5652352	N/A
Calculated Total PCB	ug/g	<0.050	<0.050	5644326	0.36	0.38	<0.050	0.050	5644326	N/A
Surrogate Recovery (%)										
Decachlorobiphenyl	%	85	86	5649662	92	92	90		5652352	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HHH062	HHH064		HHH072			
Sampling Date		2018/07/16	2018/07/16		2018/07/16			
COC Number		D 33405	D 33405		D 33406			
	UNITS	**2018-SS25**	**2018-SS27**	**QC Batch**	**2018-SS29**	**RDL**	**QC Batch**	**MDL**
PCBs								
Aroclor 1016	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1221	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1232	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1248	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1242	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1254	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Aroclor 1260	ug/g	<0.050	<0.050	5652352	<0.050	0.050	5658728	N/A
Calculated Total PCB	ug/g	<0.050	<0.050	5644326	<0.050	0.050	5644326	N/A
Surrogate Recovery (%)								
Decachlorobiphenyl	%	94	90	5652352	101		5658728	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
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Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHG991 **Collected:** 2018/07/15
Sample ID: 2018-MW41-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (AA PIRI)	GC/FID	5648896	2018/07/26	2018/08/03	Bria Harvey
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T2) Calc. for Soil	CALC	5644334	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI2) - Field Preserved	PTGC/MS	5658687	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHG991 Dup **Collected:** 2018/07/15
Sample ID: 2018-MW41-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald

Maxxam ID: HHG992 **Collected:** 2018/07/15
Sample ID: 2018-MW41-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/27	2018/08/03	Kelly Gale

Maxxam ID: HHG993 **Collected:** 2018/07/15
Sample ID: 2018-MW41-GP06 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/07/31	Michelle Shearer
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/02	Jacob Henley

Maxxam ID: HHG994 **Collected:** 2018/07/16
Sample ID: 2018-MW40-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/02	Jacob Henley

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
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TEST SUMMARY

Maxxam ID: HHG995 **Collected:** 2018/07/16
Sample ID: 2018-MW40-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery

Maxxam ID: HHG996 **Collected:** 2018/07/16
Sample ID: 2018-MW39-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/02	Jacob Henley

Maxxam ID: HHG997 **Collected:** 2018/07/16
Sample ID: 2018-MW39-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/30	2018/08/03	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk

Maxxam ID: HHG998 **Collected:** 2018/07/16
Sample ID: 2018-MW39-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/02	Jacob Henley

Maxxam ID: HHG999 **Collected:** 2018/07/16
Sample ID: 2018-MW38-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/30	2018/08/03	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk

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Stantec Consulting Ltd
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TEST SUMMARY

Maxxam ID: HHH000 **Collected:** 2018/07/16
Sample ID: 2018-MW38-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH000 Dup **Collected:** 2018/07/16
Sample ID: 2018-MW38-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery

Maxxam ID: HHH005 **Collected:** 2018/07/16
Sample ID: 2018-MW38-GP08 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH006 **Collected:** 2018/07/16
Sample ID: 2018-MW37-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5652412	2018/07/27	2018/08/01	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH007 **Collected:** 2018/07/16
Sample ID: 2018-MW37-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk

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TEST SUMMARY

Maxxam ID: HHH008 **Collected:** 2018/07/16
Sample ID: 2018-MW37-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/30	2018/08/03	Kelly Gale

Maxxam ID: HHH009 **Collected:** 2018/07/16
Sample ID: 2018-MW34-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH010 **Collected:** 2018/07/16
Sample ID: 2018-MW34-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/30	2018/08/03	Kelly Gale

Maxxam ID: HHH011 **Collected:** 2018/07/16
Sample ID: 2018-MW33-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/07	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
PAH Compounds by GCMS (SIM)	GC/MS	5655266	2018/07/30	2018/08/03	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH012 **Collected:** 2018/07/16
Sample ID: 2018-MW33-GP03 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery

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TEST SUMMARY

Maxxam ID: HHH013 **Collected:** 2018/07/16
Sample ID: 2018-BH35-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery

Maxxam ID: HHH014 **Collected:** 2018/07/16
Sample ID: 2018-BH35-GP06 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5649146	N/A	2018/07/26	Rosemarie MacDonald
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH014 Dup **Collected:** 2018/07/16
Sample ID: 2018-BH35-GP06 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer

Maxxam ID: HHH030 **Collected:** 2018/07/16
Sample ID: 2018-BH36-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/28	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH031 **Collected:** 2018/07/16
Sample ID: 2018-BH36-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5648964	2018/07/26	2018/07/27	Bryon Angevine

Maxxam ID: HHH031 Dup **Collected:** 2018/07/16
Sample ID: 2018-BH36-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5648964	2018/07/26	2018/07/27	Bryon Angevine

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TEST SUMMARY

Maxxam ID: HHH032 **Collected:** 2018/07/16
Sample ID: 2018-SS07 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/28	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649662	2018/07/26	2018/07/27	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/27	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH033 **Collected:** 2018/07/16
Sample ID: 2018-SS08 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH034 **Collected:** 2018/07/16
Sample ID: 2018-SS09 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651135	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH034 Dup **Collected:** 2018/07/16
Sample ID: 2018-SS09 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5651135	2018/07/27	2018/07/27	Cassandra Hartery

Maxxam ID: HHH035 **Collected:** 2018/07/16
Sample ID: 2018-SS60 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar

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Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH035 **Collected:** 2018/07/16
Sample ID: 2018-SS60 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH035 Dup **Collected:** 2018/07/16
Sample ID: 2018-SS60 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar

Maxxam ID: HHH036 **Collected:** 2018/07/16
Sample ID: 2018-SS10 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH037 **Collected:** 2018/07/16
Sample ID: 2018-SS11 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5661393	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH038 **Collected:** 2018/07/16
Sample ID: 2018-SS12 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HHH038 Dup
Sample ID: 2018-SS12
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH039
Sample ID: 2018-SS13
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/28	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH040
Sample ID: 2018-SS61
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/28	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5655035	2018/07/30	2018/07/31	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH041
Sample ID: 2018-SS14
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH042
Sample ID: 2018-SS62
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer

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TEST SUMMARY

Maxxam ID: HHH042
Sample ID: 2018-SS62
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH043
Sample ID: 2018-SS15
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/28	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH044
Sample ID: 2018-SS16
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/31	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH045
Sample ID: 2018-SS17
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH046
Sample ID: 2018-SS18
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk

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TEST SUMMARY

Maxxam ID: HHH046
Sample ID: 2018-SS18
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH047
Sample ID: 2018-SS19
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH048
Sample ID: 2018-SS63
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654207	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644592	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH049
Sample ID: 2018-SS20
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646614	N/A	2018/07/25	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HHH055
Sample ID: 2018-SS64
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/07/27	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH055 Dup
Sample ID: 2018-SS64
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/07/27	Lisa Gates

Maxxam ID: HHH056
Sample ID: 2018-SS21
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH057
Sample ID: 2018-SS65
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HHH058
Sample ID: 2018-SS22
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/03	Shawn Helmkay

Maxxam ID: HHH059
Sample ID: 2018-SS66
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/04	Shawn Helmkay

Maxxam ID: HHH060
Sample ID: 2018-SS23
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/28	Cassandra Hartery
Moisture	BAL	5647081	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/04	Shawn Helmkay

Maxxam ID: HHH061
Sample ID: 2018-SS24
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/28	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH061 **Collected:** 2018/07/16
Sample ID: 2018-SS24 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/04	Shawn Helmkay

Maxxam ID: HHH062 **Collected:** 2018/07/16
Sample ID: 2018-SS25 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/28	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/07	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663012	N/A	2018/08/04	Shawn Helmkay

Maxxam ID: HHH063 **Collected:** 2018/07/16
Sample ID: 2018-SS26 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/28	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/03	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH063 Dup **Collected:** 2018/07/16
Sample ID: 2018-SS26 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH064 **Collected:** 2018/07/16
Sample ID: 2018-SS27 **Shipped:**
Matrix: Soil **Received:** 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5651141	2018/07/27	2018/07/28	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH064
Sample ID: 2018-SS27
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH070
Sample ID: 2018-SS28
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH070 Dup
Sample ID: 2018-SS28
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer

Maxxam ID: HHH071
Sample ID: 2018-SS67
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/08/11	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648960	2018/07/26	2018/08/09	Lisa Gates
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

Maxxam ID: HHH072
Sample ID: 2018-SS29
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654209	2018/07/30	2018/07/31	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654311	2018/07/30	2018/07/31	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH072
Sample ID: 2018-SS29
Matrix: Soil

Collected: 2018/07/16
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in soil by GC/ECD	GC/ECD	5658728	2018/07/30	2018/08/02	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/08/02	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644427	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5663041	N/A	2018/08/03	Jacob Henley

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	3.3°C
Package 2	3.3°C
Package 3	0.0°C
Package 4	2.7°C
Package 5	4.3°C
Package 6	2.0°C
Package 7	3.3°C

Revised Report: Report re-issued due to IT related error. KN1 2018/08/23

Results relate only to the items tested.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648754	D10-Anthracene	2018/07/26	88	50 - 130	104	50 - 130	108	%		
5648754	D14-Terphenyl (FS)	2018/07/26	104	50 - 130	101	50 - 130	106	%		
5648754	D8-Acenaphthylene	2018/07/26	97	50 - 130	102	50 - 130	100	%		
5648896	Isobutylbenzene - Extractable	2018/08/02					106	%		
5648896	n-Dotriacontane - Extractable	2018/08/02					95	%		
5648960	D10-Anthracene	2018/07/27	95	50 - 130	96	50 - 130	81	%		
5648960	D14-Terphenyl (FS)	2018/07/27	93	50 - 130	97	50 - 130	82	%		
5648960	D8-Acenaphthylene	2018/07/27	94	50 - 130	97	50 - 130	94	%		
5649662	Decachlorobiphenyl	2018/07/27	73	70 - 130	86	70 - 130	88	%		
5652352	Decachlorobiphenyl	2018/07/31	92	70 - 130	95	70 - 130	88	%		
5652412	Isobutylbenzene - Extractable	2018/07/31	112	60 - 130	97	60 - 130	95	%		
5652412	n-Dotriacontane - Extractable	2018/07/31	98	60 - 130	98	60 - 130	99	%		
5654203	Isobutylbenzene - Extractable	2018/07/30	94	60 - 130	89	60 - 130	89	%		
5654203	n-Dotriacontane - Extractable	2018/07/30	103	60 - 130	98	60 - 130	102	%		
5654207	Isobutylbenzene - Extractable	2018/07/30	108	60 - 130	95	60 - 130	96	%		
5654207	n-Dotriacontane - Extractable	2018/07/30	108	60 - 130	99	60 - 130	102	%		
5654209	Isobutylbenzene - Extractable	2018/07/31	97	60 - 130	92	60 - 130	86	%		
5654209	n-Dotriacontane - Extractable	2018/07/31	101	60 - 130	109	60 - 130	102	%		
5655035	Isobutylbenzene - Extractable	2018/07/31	106	60 - 130	102	60 - 130	101	%		
5655035	n-Dotriacontane - Extractable	2018/07/31	109	60 - 130	103	60 - 130	99	%		
5655266	D10-Anthracene	2018/08/01	94	50 - 130	95	50 - 130	89	%		
5655266	D14-Terphenyl (FS)	2018/08/01	95	50 - 130	91	50 - 130	104	%		
5655266	D8-Acenaphthylene	2018/08/01	94	50 - 130	88	50 - 130	97	%		
5658687	Isobutylbenzene - Volatile	2018/08/02			91	60 - 130	94	%		
5658728	Decachlorobiphenyl	2018/08/02	98	70 - 130	95	70 - 130	94	%		
5661393	Isobutylbenzene - Volatile	2018/08/02	94	60 - 130	94	60 - 130	97	%		
5663012	Isobutylbenzene - Volatile	2018/08/03	109 (3)	60 - 130	97	60 - 130	95	%		
5663041	Isobutylbenzene - Volatile	2018/08/03	105	60 - 130	116	60 - 130	114	%		
5646614	Moisture	2018/07/25							2.5	25
5647081	Moisture	2018/07/26							8.7	25
5647469	Moisture	2018/07/26							14	25

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648754	1-Methylnaphthalene	2018/07/26	84	50 - 130	83	50 - 130	<0.010	mg/kg	NC	50
5648754	2-Methylnaphthalene	2018/07/26	90	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648754	Acenaphthene	2018/07/26	89	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648754	Acenaphthylene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648754	Anthracene	2018/07/26	90	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(a)anthracene	2018/07/26	89	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(a)pyrene	2018/07/26	87	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(b)fluoranthene	2018/07/26	94	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(g,h,i)perylene	2018/07/26	96	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(j)fluoranthene	2018/07/26	88	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(k)fluoranthene	2018/07/26	91	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5648754	Chrysene	2018/07/26	86	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50
5648754	Dibenz(a,h)anthracene	2018/07/26	88	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50
5648754	Fluoranthene	2018/07/26	91	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5648754	Fluorene	2018/07/26	94	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5648754	Indeno(1,2,3-cd)pyrene	2018/07/26	85	50 - 130	81	50 - 130	<0.010	mg/kg	NC	50
5648754	Naphthalene	2018/07/26	89	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50
5648754	Perylene	2018/07/26	89	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5648754	Phenanthrene	2018/07/26	97	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5648754	Pyrene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648896	Aliphatic >C10-C12	2018/08/02			79	60 - 130	<8.0	mg/kg	12	50
5648896	Aliphatic >C12-C16	2018/08/02			76	60 - 130	<15	mg/kg	8.9	50
5648896	Aliphatic >C16-C21	2018/08/02			76	60 - 130	<15	mg/kg	21	50
5648896	Aliphatic >C21-<C32	2018/08/02			77	60 - 130	<15	mg/kg	9.8	50
5648896	Aromatic >C10-C12	2018/08/02			100	60 - 130	<4.0	mg/kg	42	50
5648896	Aromatic >C12-C16	2018/08/02			97	60 - 130	<15	mg/kg	39	50
5648896	Aromatic >C16-C21	2018/08/02			95	60 - 130	<15	mg/kg	28	50
5648896	Aromatic >C21-<C32	2018/08/02			92	60 - 130	<15	mg/kg	21	50
5648960	1-Methylnaphthalene	2018/07/27	81	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50
5648960	2-Methylnaphthalene	2018/07/27	88	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5648960	Acenaphthene	2018/07/27	87	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648960	Acenaphthylene	2018/07/27	95	50 - 130	99	50 - 130	<0.010	mg/kg	NC	50
5648960	Anthracene	2018/07/27	85	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(a)anthracene	2018/07/27	85	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(a)pyrene	2018/07/27	83	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(b)fluoranthene	2018/07/27	104	50 - 130	102	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(g,h,i)perylene	2018/07/27	89	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(j)fluoranthene	2018/07/27	84	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648960	Benzo(k)fluoranthene	2018/07/27	92	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5648960	Chrysene	2018/07/27	80	50 - 130	85	50 - 130	<0.010	mg/kg	NC	50
5648960	Dibenz(a,h)anthracene	2018/07/27	84	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648960	Fluoranthene	2018/07/27	85	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648960	Fluorene	2018/07/27	95	50 - 130	97	50 - 130	<0.010	mg/kg	NC	50
5648960	Indeno(1,2,3-cd)pyrene	2018/07/27	81	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5648960	Naphthalene	2018/07/27	90	50 - 130	94	50 - 130	<0.010	mg/kg	NC	50
5648960	Perylene	2018/07/27	79	50 - 130	83	50 - 130	<0.010	mg/kg	NC	50
5648960	Phenanthrene	2018/07/27	85	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648960	Pyrene	2018/07/27	86	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5648964	Acid Extractable Aluminum (Al)	2018/07/27					<10	mg/kg	11	35
5648964	Acid Extractable Antimony (Sb)	2018/07/27	111	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Arsenic (As)	2018/07/27	101	75 - 125	101	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Barium (Ba)	2018/07/27	NC	75 - 125	100	75 - 125	<5.0	mg/kg	6.8	35
5648964	Acid Extractable Beryllium (Be)	2018/07/27	94	75 - 125	92	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Bismuth (Bi)	2018/07/27	105	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Boron (B)	2018/07/27	88	75 - 125	90	75 - 125	<50	mg/kg	NC	35
5648964	Acid Extractable Cadmium (Cd)	2018/07/27	103	75 - 125	103	75 - 125	<0.30	mg/kg	NC	35
5648964	Acid Extractable Chromium (Cr)	2018/07/27	95	75 - 125	98	75 - 125	<2.0	mg/kg	7.5	35
5648964	Acid Extractable Cobalt (Co)	2018/07/27	95	75 - 125	97	75 - 125	<1.0	mg/kg	9.0	35
5648964	Acid Extractable Copper (Cu)	2018/07/27	94	75 - 125	97	75 - 125	<2.0	mg/kg	13	35
5648964	Acid Extractable Iron (Fe)	2018/07/27					<50	mg/kg	7.0	35
5648964	Acid Extractable Lead (Pb)	2018/07/27	98	75 - 125	101	75 - 125	<0.50	mg/kg	4.1	35
5648964	Acid Extractable Lithium (Li)	2018/07/27	97	75 - 125	100	75 - 125	<2.0	mg/kg	7.2	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648964	Acid Extractable Manganese (Mn)	2018/07/27	NC	75 - 125	101	75 - 125	<2.0	mg/kg	5.2	35
5648964	Acid Extractable Mercury (Hg)	2018/07/27	95	75 - 125	106	75 - 125	<0.10	mg/kg	NC	35
5648964	Acid Extractable Molybdenum (Mo)	2018/07/27	103	75 - 125	107	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Nickel (Ni)	2018/07/27	94	75 - 125	98	75 - 125	<2.0	mg/kg	27	35
5648964	Acid Extractable Rubidium (Rb)	2018/07/27	101	75 - 125	100	75 - 125	<2.0	mg/kg	0.30	35
5648964	Acid Extractable Selenium (Se)	2018/07/27	101	75 - 125	101	75 - 125	<1.0	mg/kg	NC	35
5648964	Acid Extractable Silver (Ag)	2018/07/27	101	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35
5648964	Acid Extractable Strontium (Sr)	2018/07/27	105	75 - 125	103	75 - 125	<5.0	mg/kg	8.9	35
5648964	Acid Extractable Thallium (Tl)	2018/07/27	105	75 - 125	106	75 - 125	<0.10	mg/kg	NC	35
5648964	Acid Extractable Tin (Sn)	2018/07/27	108	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5648964	Acid Extractable Uranium (U)	2018/07/27	101	75 - 125	101	75 - 125	<0.10	mg/kg	3.2	35
5648964	Acid Extractable Vanadium (V)	2018/07/27	90	75 - 125	99	75 - 125	<2.0	mg/kg	34	35
5648964	Acid Extractable Zinc (Zn)	2018/07/27	91	75 - 125	103	75 - 125	<5.0	mg/kg	0.38	35
5649146	Moisture	2018/07/26							5.5	25
5649662	Aroclor 1016	2018/07/27					<0.050	ug/g	NC	50
5649662	Aroclor 1221	2018/07/27					<0.050	ug/g	NC	50
5649662	Aroclor 1232	2018/07/27					<0.050	ug/g	NC	50
5649662	Aroclor 1242	2018/07/27					<0.050	ug/g	NC	50
5649662	Aroclor 1248	2018/07/27					<0.050	ug/g	NC	50
5649662	Aroclor 1254	2018/07/27	128	70 - 130	107	70 - 130	<0.050	ug/g	NC	50
5649662	Aroclor 1260	2018/07/27					<0.050	ug/g	NC	50
5651135	Acid Extractable Aluminum (Al)	2018/07/27					<10	mg/kg	8.3	35
5651135	Acid Extractable Antimony (Sb)	2018/07/27	94	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Arsenic (As)	2018/07/27	103	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Barium (Ba)	2018/07/27	89	75 - 125	100	75 - 125	<5.0	mg/kg	12	35
5651135	Acid Extractable Beryllium (Be)	2018/07/27	102	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Bismuth (Bi)	2018/07/27	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Boron (B)	2018/07/27	100	75 - 125	104	75 - 125	<50	mg/kg	NC	35
5651135	Acid Extractable Cadmium (Cd)	2018/07/27	104	75 - 125	104	75 - 125	<0.30	mg/kg	11	35
5651135	Acid Extractable Chromium (Cr)	2018/07/27	95	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Cobalt (Co)	2018/07/27	103	75 - 125	102	75 - 125	<1.0	mg/kg	3.2	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5651135	Acid Extractable Copper (Cu)	2018/07/27	100	75 - 125	100	75 - 125	<2.0	mg/kg	1.7	35
5651135	Acid Extractable Iron (Fe)	2018/07/27					<50	mg/kg	3.0	35
5651135	Acid Extractable Lead (Pb)	2018/07/27	81	75 - 125	101	75 - 125	<0.50	mg/kg	42 (1)	35
5651135	Acid Extractable Lithium (Li)	2018/07/27	102	75 - 125	105	75 - 125	<2.0	mg/kg	8.9	35
5651135	Acid Extractable Manganese (Mn)	2018/07/27	NC	75 - 125	103	75 - 125	<2.0	mg/kg	6.5	35
5651135	Acid Extractable Mercury (Hg)	2018/07/27	98	75 - 125	108	75 - 125	<0.10	mg/kg	3.9	35
5651135	Acid Extractable Molybdenum (Mo)	2018/07/27	96	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Nickel (Ni)	2018/07/27	102	75 - 125	103	75 - 125	<2.0	mg/kg	1.1	35
5651135	Acid Extractable Rubidium (Rb)	2018/07/27	99	75 - 125	103	75 - 125	<2.0	mg/kg	6.5	35
5651135	Acid Extractable Selenium (Se)	2018/07/27	103	75 - 125	103	75 - 125	<1.0	mg/kg	NC	35
5651135	Acid Extractable Silver (Ag)	2018/07/27	101	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35
5651135	Acid Extractable Strontium (Sr)	2018/07/27	103	75 - 125	106	75 - 125	<5.0	mg/kg	2.7	35
5651135	Acid Extractable Thallium (Tl)	2018/07/27	101	75 - 125	103	75 - 125	<0.10	mg/kg	NC	35
5651135	Acid Extractable Tin (Sn)	2018/07/27	98	75 - 125	110	75 - 125	<2.0	mg/kg	NC	35
5651135	Acid Extractable Uranium (U)	2018/07/27	103	75 - 125	102	75 - 125	<0.10	mg/kg	7.0	35
5651135	Acid Extractable Vanadium (V)	2018/07/27	101	75 - 125	101	75 - 125	<2.0	mg/kg	16	35
5651135	Acid Extractable Zinc (Zn)	2018/07/27	90	75 - 125	101	75 - 125	<5.0	mg/kg	5.4	35
5651141	Acid Extractable Aluminum (Al)	2018/07/28					<10	mg/kg	6.5	35
5651141	Acid Extractable Antimony (Sb)	2018/07/28	96	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Arsenic (As)	2018/07/28	99	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Barium (Ba)	2018/07/28	96	75 - 125	101	75 - 125	<5.0	mg/kg	4.9	35
5651141	Acid Extractable Beryllium (Be)	2018/07/28	105	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Bismuth (Bi)	2018/07/28	102	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Boron (B)	2018/07/28	108	75 - 125	103	75 - 125	<50	mg/kg	NC	35
5651141	Acid Extractable Cadmium (Cd)	2018/07/28	102	75 - 125	102	75 - 125	<0.30	mg/kg	NC	35
5651141	Acid Extractable Chromium (Cr)	2018/07/28	101	75 - 125	98	75 - 125	<2.0	mg/kg	12	35
5651141	Acid Extractable Cobalt (Co)	2018/07/28	101	75 - 125	99	75 - 125	<1.0	mg/kg	8.7	35
5651141	Acid Extractable Copper (Cu)	2018/07/28	103	75 - 125	97	75 - 125	<2.0	mg/kg	0.62	35
5651141	Acid Extractable Iron (Fe)	2018/07/28					<50	mg/kg	20	35
5651141	Acid Extractable Lead (Pb)	2018/07/28	97	75 - 125	101	75 - 125	<0.50	mg/kg	1.6	35
5651141	Acid Extractable Lithium (Li)	2018/07/28	106	75 - 125	103	75 - 125	<2.0	mg/kg	6.7	35

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5651141	Acid Extractable Manganese (Mn)	2018/07/28	NC	75 - 125	101	75 - 125	<2.0	mg/kg	2.8	35
5651141	Acid Extractable Mercury (Hg)	2018/07/28	96	75 - 125	107	75 - 125	<0.10	mg/kg	NC	35
5651141	Acid Extractable Molybdenum (Mo)	2018/07/28	98	75 - 125	102	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Nickel (Ni)	2018/07/28	102	75 - 125	99	75 - 125	<2.0	mg/kg	6.1	35
5651141	Acid Extractable Rubidium (Rb)	2018/07/28	101	75 - 125	101	75 - 125	<2.0	mg/kg	4.1	35
5651141	Acid Extractable Selenium (Se)	2018/07/28	102	75 - 125	101	75 - 125	<1.0	mg/kg	NC	35
5651141	Acid Extractable Silver (Ag)	2018/07/28	101	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35
5651141	Acid Extractable Strontium (Sr)	2018/07/28	104	75 - 125	105	75 - 125	<5.0	mg/kg	4.7	35
5651141	Acid Extractable Thallium (Tl)	2018/07/28	102	75 - 125	104	75 - 125	<0.10	mg/kg	NC	35
5651141	Acid Extractable Tin (Sn)	2018/07/28	99	75 - 125	109	75 - 125	<2.0	mg/kg	NC	35
5651141	Acid Extractable Uranium (U)	2018/07/28	98	75 - 125	101	75 - 125	<0.10	mg/kg	2.4	35
5651141	Acid Extractable Vanadium (V)	2018/07/28	91	75 - 125	100	75 - 125	<2.0	mg/kg	22	35
5651141	Acid Extractable Zinc (Zn)	2018/07/28	101	75 - 125	106	75 - 125	<5.0	mg/kg	6.2	35
5652352	Aroclor 1016	2018/07/31					<0.050	ug/g	NC	50
5652352	Aroclor 1221	2018/07/31					<0.050	ug/g	NC	50
5652352	Aroclor 1232	2018/07/31					<0.050	ug/g	NC	50
5652352	Aroclor 1242	2018/07/31					<0.050	ug/g	NC	50
5652352	Aroclor 1248	2018/07/31					<0.050	ug/g	NC	50
5652352	Aroclor 1254	2018/07/31	114	70 - 130	111	70 - 130	<0.050	ug/g	NC	50
5652352	Aroclor 1260	2018/07/31					<0.050	ug/g	NC	50
5652412	>C10-C16 Hydrocarbons	2018/08/01	71	30 - 130	94	60 - 130	<10	mg/kg	32	50
5652412	>C16-C21 Hydrocarbons	2018/08/01	84	30 - 130	93	60 - 130	<10	mg/kg	NC	50
5652412	>C21-<C32 Hydrocarbons	2018/08/01	81	30 - 130	106	60 - 130	<15	mg/kg	15	50
5654203	>C10-C16 Hydrocarbons	2018/07/30	104	30 - 130	96	60 - 130	<10	mg/kg	NC	50
5654203	>C16-C21 Hydrocarbons	2018/07/30	90	30 - 130	83	60 - 130	<10	mg/kg	NC	50
5654203	>C21-<C32 Hydrocarbons	2018/07/30	100	30 - 130	96	60 - 130	<15	mg/kg	NC	50
5654207	>C10-C16 Hydrocarbons	2018/07/30	97	30 - 130	85	60 - 130	<10	mg/kg	NC	50
5654207	>C16-C21 Hydrocarbons	2018/07/30	96	30 - 130	84	60 - 130	<10	mg/kg	NC	50
5654207	>C21-<C32 Hydrocarbons	2018/07/30	106	30 - 130	97	60 - 130	<15	mg/kg	NC	50
5654209	>C10-C16 Hydrocarbons	2018/07/31	106	30 - 130	101	60 - 130	<10	mg/kg	NC	50
5654209	>C16-C21 Hydrocarbons	2018/07/31	93	30 - 130	89	60 - 130	<10	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5654209	>C21-<C32 Hydrocarbons	2018/07/31	101	30 - 130	102	60 - 130	<15	mg/kg	NC	50
5654311	Acid Extractable Aluminum (Al)	2018/07/31					<10	mg/kg	4.4	35
5654311	Acid Extractable Antimony (Sb)	2018/07/31	99	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Arsenic (As)	2018/07/31	102	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Barium (Ba)	2018/07/31	NC	75 - 125	99	75 - 125	<5.0	mg/kg	5.5	35
5654311	Acid Extractable Beryllium (Be)	2018/07/31	107	75 - 125	106	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Bismuth (Bi)	2018/07/31	108	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Boron (B)	2018/07/31	112	75 - 125	113	75 - 125	<50	mg/kg	NC	35
5654311	Acid Extractable Cadmium (Cd)	2018/07/31	104	75 - 125	106	75 - 125	<0.30	mg/kg	NC	35
5654311	Acid Extractable Chromium (Cr)	2018/07/31	99	75 - 125	101	75 - 125	<2.0	mg/kg	6.2	35
5654311	Acid Extractable Cobalt (Co)	2018/07/31	102	75 - 125	102	75 - 125	<1.0	mg/kg	7.3	35
5654311	Acid Extractable Copper (Cu)	2018/07/31	102	75 - 125	102	75 - 125	<2.0	mg/kg	7.0	35
5654311	Acid Extractable Iron (Fe)	2018/07/31					<50	mg/kg	3.3	35
5654311	Acid Extractable Lead (Pb)	2018/07/31	97	75 - 125	98	75 - 125	<0.50	mg/kg	7.3	35
5654311	Acid Extractable Lithium (Li)	2018/07/31	107	75 - 125	105	75 - 125	<2.0	mg/kg	8.5	35
5654311	Acid Extractable Manganese (Mn)	2018/07/31	NC	75 - 125	105	75 - 125	<2.0	mg/kg	0.023	35
5654311	Acid Extractable Mercury (Hg)	2018/07/31	95	75 - 125	105	75 - 125	<0.10	mg/kg	NC	35
5654311	Acid Extractable Molybdenum (Mo)	2018/07/31	101	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Nickel (Ni)	2018/07/31	103	75 - 125	104	75 - 125	<2.0	mg/kg	14	35
5654311	Acid Extractable Rubidium (Rb)	2018/07/31	102	75 - 125	101	75 - 125	<2.0	mg/kg	1.3	35
5654311	Acid Extractable Selenium (Se)	2018/07/31	104	75 - 125	108	75 - 125	<1.0	mg/kg	NC	35
5654311	Acid Extractable Silver (Ag)	2018/07/31	103	75 - 125	103	75 - 125	<0.50	mg/kg	NC	35
5654311	Acid Extractable Strontium (Sr)	2018/07/31	103	75 - 125	100	75 - 125	<5.0	mg/kg	2.9	35
5654311	Acid Extractable Thallium (Tl)	2018/07/31	100	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35
5654311	Acid Extractable Tin (Sn)	2018/07/31	103	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5654311	Acid Extractable Uranium (U)	2018/07/31	98	75 - 125	99	75 - 125	<0.10	mg/kg	20	35
5654311	Acid Extractable Vanadium (V)	2018/07/31	102	75 - 125	103	75 - 125	<2.0	mg/kg	0.46	35
5654311	Acid Extractable Zinc (Zn)	2018/07/31	115	75 - 125	107	75 - 125	<5.0	mg/kg	1.9	35
5655035	>C10-C16 Hydrocarbons	2018/07/31	NC	30 - 130	93	60 - 130	<10	mg/kg	42	50
5655035	>C16-C21 Hydrocarbons	2018/07/31	80	30 - 130	89	60 - 130	<10	mg/kg	38	50
5655035	>C21-<C32 Hydrocarbons	2018/07/31	89	30 - 130	99	60 - 130	<15	mg/kg	45	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5655266	1-Methylnaphthalene	2018/08/01	93	50 - 130	108	50 - 130	<0.010	mg/kg	NC	50
5655266	2-Methylnaphthalene	2018/08/01	104	50 - 130	119	50 - 130	<0.010	mg/kg	NC	50
5655266	Acenaphthene	2018/08/01	92	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5655266	Acenaphthylene	2018/08/01	107	50 - 130	104	50 - 130	<0.010	mg/kg	NC	50
5655266	Anthracene	2018/08/01	93	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5655266	Benzo(a)anthracene	2018/08/01	95	50 - 130	96	50 - 130	<0.010	mg/kg	NC	50
5655266	Benzo(a)pyrene	2018/08/01	103	50 - 130	111	50 - 130	<0.010	mg/kg	NC (2)	50
5655266	Benzo(b)fluoranthene	2018/08/01	106	50 - 130	112	50 - 130	<0.010	mg/kg	NC (2)	50
5655266	Benzo(g,h,i)perylene	2018/08/01	106	50 - 130	115	50 - 130	<0.010	mg/kg	33	50
5655266	Benzo(j)fluoranthene	2018/08/01	104	50 - 130	109	50 - 130	<0.010	mg/kg	NC	50
5655266	Benzo(k)fluoranthene	2018/08/01	98	50 - 130	112	50 - 130	<0.010	mg/kg	NC	50
5655266	Chrysene	2018/08/01	89	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5655266	Dibenz(a,h)anthracene	2018/08/01	99	50 - 130	108	50 - 130	<0.010	mg/kg	NC	50
5655266	Fluoranthene	2018/08/01	99	50 - 130	91	50 - 130	<0.010	mg/kg	NC (2)	50
5655266	Fluorene	2018/08/01	116	50 - 130	112	50 - 130	<0.010	mg/kg	6.0	50
5655266	Indeno(1,2,3-cd)pyrene	2018/08/01	98	50 - 130	105	50 - 130	<0.010	mg/kg	NC	50
5655266	Naphthalene	2018/08/01	94	50 - 130	100	50 - 130	<0.010	mg/kg	NC	50
5655266	Perylene	2018/08/01	106	50 - 130	111	50 - 130	<0.010	mg/kg	NC	50
5655266	Phenanthrene	2018/08/01	85	50 - 130	73	50 - 130	<0.010	mg/kg	NC (2)	50
5655266	Pyrene	2018/08/01	95	50 - 130	89	50 - 130	<0.010	mg/kg	3.5	50
5658687	>C8-C10 Aromatics (-EX)	2018/08/02					<0.50	mg/kg		
5658687	Aliphatic >C6-C8	2018/08/02					<1.0	mg/kg		
5658687	Aliphatic >C8-C10	2018/08/02					<1.0	mg/kg		
5658687	Benzene	2018/08/02			107	60 - 140	<0.025	mg/kg		
5658687	Ethylbenzene	2018/08/02			107	60 - 140	<0.025	mg/kg		
5658687	Toluene	2018/08/02			106	60 - 140	<0.025	mg/kg		
5658687	Total Xylenes	2018/08/02			105	60 - 140	<0.050	mg/kg		
5658728	Aroclor 1016	2018/08/02					<0.050	ug/g	NC	50
5658728	Aroclor 1221	2018/08/02					<0.050	ug/g	NC	50
5658728	Aroclor 1232	2018/08/02					<0.050	ug/g	NC	50
5658728	Aroclor 1242	2018/08/02					<0.050	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5658728	Aroclor 1248	2018/08/02					<0.050	ug/g	NC	50
5658728	Aroclor 1254	2018/08/02	93	70 - 130	94	70 - 130	<0.050	ug/g	NC	50
5658728	Aroclor 1260	2018/08/02			0	N/A	<0.050	ug/g	NC	50
5661393	Benzene	2018/08/02	86	60 - 130	96	60 - 140	<0.025	mg/kg	5.3	50
5661393	C6 - C10 (less BTEX)	2018/08/02					<2.5	mg/kg	36	50
5661393	Ethylbenzene	2018/08/02	93	60 - 130	96	60 - 140	<0.025	mg/kg	3.1	50
5661393	Toluene	2018/08/02	77	60 - 130	93	60 - 140	<0.025	mg/kg	3.5	50
5661393	Total Xylenes	2018/08/02	89	60 - 130	93	60 - 140	<0.050	mg/kg	3.3	50
5663012	Benzene	2018/08/03	94	60 - 130	101	60 - 140	<0.025	mg/kg	NC	50
5663012	C6 - C10 (less BTEX)	2018/08/03					<2.5	mg/kg	NC	50
5663012	Ethylbenzene	2018/08/03	98	60 - 130	102	60 - 140	<0.025	mg/kg	NC	50
5663012	Toluene	2018/08/03	89	60 - 130	100	60 - 140	<0.025	mg/kg	NC	50
5663012	Total Xylenes	2018/08/03	92	60 - 130	97	60 - 140	<0.050	mg/kg	NC	50
5663041	Benzene	2018/08/03	94	60 - 130	95	60 - 140	<0.025	mg/kg	NC	50
5663041	C6 - C10 (less BTEX)	2018/08/03					<2.5	mg/kg	NC	50
5663041	Ethylbenzene	2018/08/03	97	60 - 130	94	60 - 140	<0.025	mg/kg	NC	50
5663041	Toluene	2018/08/03	94	60 - 130	94	60 - 140	<0.025	mg/kg	NC	50
5663041	Total Xylenes	2018/08/03	97	60 - 130	93	60 - 140	<0.050	mg/kg	NC	50

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor RPD due to sample inhomogeneity. < 10 % of compounds in multi-component analysis in violation.

(2) Elevated PAH RDL(s) due to matrix / co-extractive interference.

(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5438
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Rosemarie MacDonald, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33401 Page 1 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL/CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW41-GP01	2018/07/15		soil									X								X							TPH Fractionation
2	2018-MW41-GP02	↓		↓													X											
3	2018-MW41-GP06	↓		↓													X											
4	2018-MW40-GP01	2018/07/16		↓													X						X					
5	2018-MW40-GP02	↓		↓									X															
6	2018-MW39-GP01	↓		↓									X				X											
7	2018-MW38-GP02	↓		↓																	X		X					
8	2018-MW39-GP03	↓		↓									X				X											
9	2018-MW38-GP01	↓		↓																	X		X					
10	2018-MW38-GP02	↓		↓									X				X											

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			[signature]	2018/07/20	9:24	B8I5438

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CHAIN OF CUSTODY RECORD

COC #: D33402 Page 2 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr. St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default: Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low-level T.E.H.	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW38-GP08	2018/07/16		Soil									X				X												
2	2018-MW37-GP01												X				X												
3	2018-MW37-GP02																						X						
4	2018-MW37-GP03																				X								
5	2018-MW34-GP01												X				X				·								
6	2018-MW34-GP02																				X								
7	2018-MW33-GP01												·				X				X		X						
8	2018-MW33-GP03												X																
9	2018-BH35-GP01												X																
10	2018-BH35-GP06																X												

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* Jars labelled as BH32 in this cooler but should be reported as BH35

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CHAIN OF CUSTODY RECORD

COC #: D33403 Page 3 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St. John's NL Postal Code: A1B 0A2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-BH36-GP01	2018/07/16		soil													X				X								
2	2018-BH36-GP02	↓		↓									X																
3	2018-SS07																X				X		X						
4	2018-SS08																X												
5	2018-SS09												X				X												
6	2018-SS60												X				X												
7	2018-SS10												X				X												
8	2018-SS11												X				X												
9	2018-SS12																X												
10	2018-SS13	↓		↓													X					X							

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			Mark Thomas	2018/07/20	9:24	B815438

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COC #: D33404 Page 4 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most Analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St Johns NL Postal Code: A1B0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

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Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-[redacted] SS61	2018/07/16		Soil													X				X							
2	2018 - SS14												X				X						X					
3	2018 - SS62												X				X						X					
4	2018 - SS15																X				X							
5	2018 - SS16																X											
6	2018 - SS17																X											
7	2018 - SS18												X				X				X							
8	2018 - SS19																X				X							
9	2018 - SS63																X				X							
10	2018 - SS20												X				X				X							

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CHAIN OF CUSTODY RECORD

COC #: D33405 Page 5 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	☒ Regular TAT (5 business days) Most Analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Dr St Johns NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0A2	Postal Code:	Site Location: Border Beacon.	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP.	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

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Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)
1	2018 - SS64	2018/07/16		Soil									X				X				X								COMMENTS
2	2018 - SS21	↓		↓									X				X				X								
3	2018 - SS65												X				X				X								
4	2018 - SS22												X				X				X								
5	2018 - SS66												X				X				X								
6	2018 - SS23												X				X					X							
7	2018 - SS24												X				X				X								
8	2018 - SS25												X				X					X							
9	2018 - SS26												X				X				X								
10	2018 - SS27	↓		↓									X				X					X							

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			Mark Hennessey	2018/07/20	9:24	B8I5438

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CHAIN OF CUSTODY RECORD

COC #: D33406 Page 6 of 6

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name: Stantec	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim SLADE	Contact Name: Jim Slade	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St. John's, NL. Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon.	DATE REQUIRED:
Email: James.slade@stantec.com.	Email:	Site #:	
		Sampled By: AP/RP.	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		8.3, 8.3, 8.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default-Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-SS28	2018/07/16		soil									X				X				X								
2	2018-SS67	↓		↓									X				X				X								
3	2018-SS29	↓		↓									X				X						X						
4																													
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10																													

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33422, D33400

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/23
Report #: R5369900
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I5460
Received: 2018/07/23, 08:52

Sample Matrix: Soil
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	5	N/A	2018/07/27	N/A	Auto Calc.
TEH in Soil (AA PIRI)	1	2018/07/26	2018/08/02	ATL SOP 00116	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1)	7	2018/07/26	2018/07/28	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	5	2018/07/27	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Moisture	11	N/A	2018/07/26	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	5	2018/07/26	2018/07/27	ATL SOP 00102	EPA 8270E 2017 m
PCBs in soil by GC/ECD (1)	2	2018/07/26	2018/07/30	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	2	N/A	2018/07/30	N/A	Auto Calc.
ModTPH (T1) Calc. for Soil	7	N/A	2018/07/30	N/A	Atl. RBCA v3.1 m
ModTPH (T2) Calc. for Soil	1	N/A	2018/08/04	N/A	Atl. RBCA v3 m
VPH in Soil (PIRI2) - Field Preserved (2)	1	N/A	2018/08/02	ATL SOP 00120	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	2	N/A	2018/07/27	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	4	N/A	2018/07/28	ATL SOP 00119	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	1	N/A	2018/07/30	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D33422, D33400

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

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Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Encryption Key

Kavya Nair
Project Manager Assistant
23 Aug 2018 15:12:39

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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

Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHH140	HHH141		HHH142	HHH142			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00		2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422		D33422	D33422			
	UNITS	**2018-MW32-GP01**	**2018-MW32-GP02**	**QC Batch**	**2018-MW32-GP09**	**2018-MW32-GP09 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	7.9	9.4	5646879	13	12	1.0	5647469	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam ID		HHH143	HHH144	HHH145	HHH146			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422	D33422	D33422			
	UNITS	**2018-BH19-GP05**	**2018-MW42-GP01**	**2018-MW42-GP02**	**2018-BH44-GP01**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	16	11	13	16	1.0	5647469	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHH148	HHH149	HHH151	HHH152			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422	D33400	D33400			
	UNITS	**2018-BH44-GP06**	**2018-BH45-GP01**	**2018-MW43-GP01**	**2018-MW43-GP07**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	15	20	17	15	1.0	5647469	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH141	HHH144	HHH147	HHH150			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422	D33422	D33400			
	UNITS	**2018-MW32-GP02**	**2018-MW42-GP01**	**2018-BH44-GP02**	**2018-BH45-GP02**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3300	4900	3300	3900	10	5651062	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Barium (Ba)	mg/kg	47	53	54	47	5.0	5651062	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5651062	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5651062	N/A
Acid Extractable Chromium (Cr)	mg/kg	7.3	7.0	3.6	5.0	2.0	5651062	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.7	3.1	2.3	2.6	1.0	5651062	N/A
Acid Extractable Copper (Cu)	mg/kg	5.6	7.2	6.9	6.8	2.0	5651062	N/A
Acid Extractable Iron (Fe)	mg/kg	9600	11000	10000	9700	50	5651062	N/A
Acid Extractable Lead (Pb)	mg/kg	5.8	7.8	5.3	6.8	0.50	5651062	N/A
Acid Extractable Lithium (Li)	mg/kg	7.6	8.7	8.6	7.8	2.0	5651062	N/A
Acid Extractable Manganese (Mn)	mg/kg	110	130	110	130	2.0	5651062	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5651062	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.4	4.7	3.6	3.6	2.0	5651062	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.9	6.6	7.0	5.1	2.0	5651062	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5651062	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5651062	N/A
Acid Extractable Strontium (Sr)	mg/kg	<5.0	8.2	5.3	6.2	5.0	5651062	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5651062	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5651062	N/A
Acid Extractable Uranium (U)	mg/kg	0.61	0.94	0.88	0.99	0.10	5651062	N/A
Acid Extractable Vanadium (V)	mg/kg	9.8	13	7.4	9.9	2.0	5651062	N/A
Acid Extractable Zinc (Zn)	mg/kg	27	30	28	26	5.0	5651062	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.maxxamanalytics.com

Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHH151			
Sampling Date		2018/07/15 00:00			
COC Number		D33400			
	UNITS	**2018-MW43-GP01**	**RDL**	**QC Batch**	**MDL**
Metals					
Acid Extractable Aluminum (Al)	mg/kg	7900	10	5651062	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Barium (Ba)	mg/kg	29	5.0	5651062	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Boron (B)	mg/kg	<50	50	5651062	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	0.30	5651062	N/A
Acid Extractable Chromium (Cr)	mg/kg	8.5	2.0	5651062	N/A
Acid Extractable Cobalt (Co)	mg/kg	3.0	1.0	5651062	N/A
Acid Extractable Copper (Cu)	mg/kg	5.4	2.0	5651062	N/A
Acid Extractable Iron (Fe)	mg/kg	13000	50	5651062	N/A
Acid Extractable Lead (Pb)	mg/kg	6.9	0.50	5651062	N/A
Acid Extractable Lithium (Li)	mg/kg	9.1	2.0	5651062	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	2.0	5651062	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	0.10	5651062	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Nickel (Ni)	mg/kg	5.0	2.0	5651062	N/A
Acid Extractable Rubidium (Rb)	mg/kg	4.8	2.0	5651062	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	1.0	5651062	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	0.50	5651062	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.4	5.0	5651062	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	0.10	5651062	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	2.0	5651062	N/A
Acid Extractable Uranium (U)	mg/kg	0.62	0.10	5651062	N/A
Acid Extractable Vanadium (V)	mg/kg	16	2.0	5651062	N/A
Acid Extractable Zinc (Zn)	mg/kg	31	5.0	5651062	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH140		HHH145	HHH148	HHH149			
Sampling Date		2018/07/15 00:00		2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422		D33422	D33422	D33422			
	UNITS	**2018-MW32-GP01**	**RDL**	**2018-MW42-GP02**	**2018-BH44-GP06**	**2018-BH45-GP01**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.040 (1)	0.040	<0.010	<0.010	<0.010	0.010	5648754	N/A
2-Methylnaphthalene	mg/kg	0.018	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Acenaphthene	mg/kg	0.15	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Acenaphthylene	mg/kg	<0.080 (1)	0.080	<0.010	<0.010	<0.010	0.010	5648754	N/A
Anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	<0.020	<0.020	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Chrysene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Fluoranthene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Fluorene	mg/kg	<0.060 (1)	0.060	<0.010	<0.010	<0.010	0.010	5648754	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Naphthalene	mg/kg	<0.040 (1)	0.040	<0.010	<0.010	<0.010	0.010	5648754	N/A
Perylene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Phenanthrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Pyrene	mg/kg	<0.010	0.010	<0.010	<0.010	<0.010	0.010	5648754	N/A
Surrogate Recovery (%)									
D10-Anthracene	%	88		98	110	99		5648754	
D14-Terphenyl (FS)	%	109		103	109	108		5648754	
D8-Acenaphthylene	%	92		95	95	94		5648754	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHH152			
Sampling Date		2018/07/15 00:00			
COC Number		D33400			
	UNITS	**2018-MW43-GP07**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	mg/kg	<0.010	0.010	5648754	N/A
2-Methylnaphthalene	mg/kg	<0.010	0.010	5648754	N/A
Acenaphthene	mg/kg	<0.010	0.010	5648754	N/A
Acenaphthylene	mg/kg	<0.010	0.010	5648754	N/A
Anthracene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(a)anthracene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(a)pyrene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	5644065	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	5648754	N/A
Chrysene	mg/kg	<0.010	0.010	5648754	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	5648754	N/A
Fluoranthene	mg/kg	<0.010	0.010	5648754	N/A
Fluorene	mg/kg	<0.010	0.010	5648754	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	5648754	N/A
Naphthalene	mg/kg	<0.010	0.010	5648754	N/A
Perylene	mg/kg	<0.010	0.010	5648754	N/A
Phenanthrene	mg/kg	<0.010	0.010	5648754	N/A
Pyrene	mg/kg	<0.010	0.010	5648754	N/A
Surrogate Recovery (%)					
D10-Anthracene	%	108		5648754	
D14-Terphenyl (FS)	%	111		5648754	
D8-Acenaphthylene	%	96		5648754	

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH141				HHH142			
Sampling Date		2018/07/15 00:00				2018/07/15 00:00			
COC Number		D33422				D33422			
	UNITS	**2018-MW32-GP02**	**RDL**	**QC Batch**	**MDL**	**2018-MW32-GP09**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.025	0.025	5651384	0.010	<0.025	0.025	5658687	0.010
Toluene	mg/kg	<0.025	0.025	5651384	0.010	<0.025	0.025	5658687	0.010
Ethylbenzene	mg/kg	<0.025	0.025	5651384	0.025	<0.025	0.025	5658687	0.010
Total Xylenes	mg/kg	<0.050	0.050	5651384	N/A	2.0	0.050	5658687	0.010
Aliphatic >C6-C8	mg/kg					6.2	1.0	5658687	0.020
Aliphatic >C8-C10	mg/kg					380 (1)	10	5658687	0.080
C6 - C10 (less BTEX)	mg/kg	97	2.5	5651384	N/A				
>C10-C16 Hydrocarbons	mg/kg	1500	10	5648819	N/A				
>C8-C10 Aromatics (-EX)	mg/kg					27	0.50	5658687	0.020
>C16-C21 Hydrocarbons	mg/kg	100	10	5648819	N/A				
Aliphatic >C10-C12	mg/kg					1200	8.0	5648896	1.6
Aliphatic >C12-C16	mg/kg					1900	15	5648896	3.0
>C21-<C32 Hydrocarbons	mg/kg	<15	15	5648819	N/A				
Aliphatic >C16-C21	mg/kg					170	15	5648896	3.0
Aliphatic >C21-<C32	mg/kg					450	15	5648896	3.0
Modified TPH (Tier1)	mg/kg	1700	15	5644068	N/A				
Aromatic >C10-C12	mg/kg					310	4.0	5648896	0.80
Reached Baseline at C32	mg/kg	Yes	N/A	5648819	N/A	No	N/A	5648896	N/A
Aromatic >C12-C16	mg/kg					700	15	5648896	3.0
Hydrocarbon Resemblance	mg/kg	COMMENT (2)	N/A	5648819	N/A	COMMENT (3)	N/A	5648896	N/A
Aromatic >C16-C21	mg/kg					120	15	5648896	3.0
Aromatic >C21-<C32	mg/kg					140	15	5648896	3.0
Modified TPH (Tier 2)	mg/kg					5300	15	5644334	3.0
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%					101		5648896	
n-Dotriacontane - Extractable	%					90		5648896	
Isobutylbenzene - Extractable	%	111		5648819					
n-Dotriacontane - Extractable	%	120 (4)		5648819					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) Weathered fuel oil fraction.
(3) Fuel oil fraction. Lube oil fraction.
(4) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH141				HHH142			
Sampling Date		2018/07/15 00:00				2018/07/15 00:00			
COC Number		D33422				D33422			
	UNITS	**2018-MW32-GP02**	**RDL**	**QC Batch**	**MDL**	**2018-MW32-GP09**	**RDL**	**QC Batch**	**MDL**
Isobutylbenzene - Volatile	%					114		5658687	
Isobutylbenzene - Volatile	%	70		5651384					

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH142				HHH143	HHH144			
Sampling Date		2018/07/15 00:00				2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422				D33422	D33422			
	UNITS	**2018-MW32-GP09 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-BH19-GP05**	**2018-MW42-GP01**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/kg					<0.025	<0.025	0.025	5651384	N/A
Toluene	mg/kg					<0.025	<0.025	0.025	5651384	N/A
Ethylbenzene	mg/kg					<0.025	<0.025	0.025	5651384	0.025
Total Xylenes	mg/kg					<0.050	<0.050	0.050	5651384	N/A
C6 - C10 (less BTEX)	mg/kg					210	<2.5	2.5	5651384	N/A
>C10-C16 Hydrocarbons	mg/kg					2800	<10	10	5648819	N/A
>C16-C21 Hydrocarbons	mg/kg					610	<10	10	5648819	N/A
Aliphatic >C10-C12	mg/kg	1000	8.0	5648896	1.6					
Aliphatic >C12-C16	mg/kg	1700	15	5648896	3.0					
>C21-<C32 Hydrocarbons	mg/kg					130	<15	15	5648819	N/A
Aliphatic >C16-C21	mg/kg	200	15	5648896	3.0					
Aliphatic >C21-<C32	mg/kg	490	15	5648896	3.0					
Modified TPH (Tier1)	mg/kg					3800	<15	15	5644068	N/A
Aromatic >C10-C12	mg/kg	200	4.0	5648896	0.80					
Reached Baseline at C32	mg/kg					Yes	NA	N/A	5648819	N/A
Aromatic >C12-C16	mg/kg	470	15	5648896	3.0					
Hydrocarbon Resemblance	mg/kg					COMMENT (1)	NA	N/A	5648819	N/A
Aromatic >C16-C21	mg/kg	88	15	5648896	3.0					
Aromatic >C21-<C32	mg/kg	110	15	5648896	3.0					
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	80		5648896						
n-Dotriacontane - Extractable	%	111		5648896						
Isobutylbenzene - Extractable	%					119	90		5648819	
n-Dotriacontane - Extractable	%					112	117		5648819	
Isobutylbenzene - Volatile	%					61	123		5651384	

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

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHH146	HHH149	HHH151	HHH152			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422	D33400	D33400			
	UNITS	**2018-BH44-GP01**	**2018-BH45-GP01**	**2018-MW43-GP01**	**2018-MW43-GP07**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5651384	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5651384	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5651384	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5651384	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	2.5	5651384	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	5648819	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	5648819	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	24	<15	<15	15	5648819	N/A
Modified TPH (Tier1)	mg/kg	<15	24	<15	<15	15	5644068	N/A
Reached Baseline at C32	mg/kg	NA	Yes	NA	NA	N/A	5648819	N/A
Hydrocarbon Resemblance	mg/kg	NA	COMMENT (1)	NA	NA	N/A	5648819	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	93	93	94	93		5648819	
n-Dotriacontane - Extractable	%	126	123 (2)	124	124 (3)		5648819	
Isobutylbenzene - Volatile	%	129 (4)	126 (4)	119 (4)	129		5651384	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Unidentified compound(s) in lube oil range.
(2) TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.
(3) TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.
(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HHH140	HHH146			
Sampling Date		2018/07/15 00:00	2018/07/15 00:00			
COC Number		D33422	D33422			
	UNITS	**2018-MW32-GP01**	**2018-BH44-GP01**	**RDL**	**QC Batch**	**MDL**
PCBs						
Aroclor 1016	ug/g	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1221	ug/g	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1232	ug/g	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1248	ug/g	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1242	ug/g	<0.050	<0.050	0.050	5649293	N/A
Aroclor 1254	ug/g	0.098	<0.050	0.050	5649293	N/A
Aroclor 1260	ug/g	<0.050	<0.050	0.050	5649293	N/A
Calculated Total PCB	ug/g	0.098	<0.050	0.050	5644326	N/A
Surrogate Recovery (%)						
Decachlorobiphenyl	%	90	90		5649293	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH140
Sample ID: 2018-MW32-GP01
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
Moisture	BAL	5646879	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/30	Automated Statchk

Maxxam ID: HHH141
Sample ID: 2018-MW32-GP02
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Metals Solids Acid Extr. ICPMS	ICP/MS	5651062	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5646879	N/A	2018/07/26	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

Maxxam ID: HHH142
Sample ID: 2018-MW32-GP09
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (AA PIRI)	GC/FID	5648896	2018/07/26	2018/08/02	Bria Harvey
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
ModTPH (T2) Calc. for Soil	CALC	5644334	N/A	2018/08/04	Automated Statchk
VPH in Soil (PIRI2) - Field Preserved	PTGC/MS	5658687	N/A	2018/08/02	Shawn Helmkay

Maxxam ID: HHH142 Dup
Sample ID: 2018-MW32-GP09
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (AA PIRI)	GC/FID	5648896	2018/07/26	2018/08/02	Bria Harvey
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar

Maxxam ID: HHH143
Sample ID: 2018-BH19-GP05
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/27	Jacob Henley

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH144
Sample ID: 2018-MW42-GP01
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Metals Solids Acid Extr. ICPMS	ICP/MS	5651062	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHH145
Sample ID: 2018-MW42-GP02
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale

Maxxam ID: HHH146
Sample ID: 2018-BH44-GP01
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PCBs in soil by GC/ECD	GC/ECD	5649293	2018/07/26	2018/07/30	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5644326	N/A	2018/07/30	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/30	Jacob Henley

Maxxam ID: HHH147
Sample ID: 2018-BH44-GP02
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5651062	2018/07/27	2018/07/27	Cassandra Hartery

Maxxam ID: HHH148
Sample ID: 2018-BH44-GP06
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHH149
Sample ID: 2018-BH45-GP01
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHH150
Sample ID: 2018-BH45-GP02
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5651062	2018/07/27	2018/07/27	Cassandra Hartery

Maxxam ID: HHH151
Sample ID: 2018-MW43-GP01
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Metals Solids Acid Extr. ICPMS	ICP/MS	5651062	2018/07/27	2018/07/27	Cassandra Hartery
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/28	Jacob Henley

Maxxam ID: HHH152
Sample ID: 2018-MW43-GP07
Matrix: Soil

Collected: 2018/07/15
Shipped:
Received: 2018/07/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5644065	N/A	2018/07/27	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5648819	2018/07/26	2018/07/28	Marley Gidney
Moisture	BAL	5647469	N/A	2018/07/26	Selina Dunbar
PAH Compounds by GCMS (SIM)	GC/MS	5648754	2018/07/26	2018/07/27	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5644068	N/A	2018/07/30	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5651384	N/A	2018/07/28	Jacob Henley

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	6.9°C

Revised Report: Report re-issued due to IT related error. KN1 2018/08/23

Results relate only to the items tested.

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648754	D10-Anthracene	2018/07/26	88	50 - 130	104	50 - 130	108	%		
5648754	D14-Terphenyl (FS)	2018/07/26	104	50 - 130	101	50 - 130	106	%		
5648754	D8-Acenaphthylene	2018/07/26	97	50 - 130	102	50 - 130	100	%		
5648819	Isobutylbenzene - Extractable	2018/07/28	110	60 - 130	96	60 - 130	94	%		
5648819	n-Dotriacontane - Extractable	2018/07/28	119	60 - 130	120	60 - 130	119	%		
5648896	Isobutylbenzene - Extractable	2018/08/02					106	%		
5648896	n-Dotriacontane - Extractable	2018/08/02					95	%		
5649293	Decachlorobiphenyl	2018/07/30	144 (1)	70 - 130	88	70 - 130	93	%		
5651384	Isobutylbenzene - Volatile	2018/07/27	83 (3)	60 - 130	96	60 - 130	102	%		
5658687	Isobutylbenzene - Volatile	2018/08/02			91	60 - 130	94	%		
5646879	Moisture	2018/07/26							2.7	25
5647469	Moisture	2018/07/26							14	25
5648754	1-Methylnaphthalene	2018/07/26	84	50 - 130	83	50 - 130	<0.010	mg/kg	NC	50
5648754	2-Methylnaphthalene	2018/07/26	90	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648754	Acenaphthene	2018/07/26	89	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648754	Acenaphthylene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648754	Anthracene	2018/07/26	90	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(a)anthracene	2018/07/26	89	50 - 130	88	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(a)pyrene	2018/07/26	87	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(b)fluoranthene	2018/07/26	94	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(g,h,i)perylene	2018/07/26	96	50 - 130	91	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(j)fluoranthene	2018/07/26	88	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5648754	Benzo(k)fluoranthene	2018/07/26	91	50 - 130	93	50 - 130	<0.010	mg/kg	NC	50
5648754	Chrysene	2018/07/26	86	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50
5648754	Dibenz(a,h)anthracene	2018/07/26	88	50 - 130	84	50 - 130	<0.010	mg/kg	NC	50
5648754	Fluoranthene	2018/07/26	91	50 - 130	90	50 - 130	<0.010	mg/kg	NC	50
5648754	Fluorene	2018/07/26	94	50 - 130	95	50 - 130	<0.010	mg/kg	NC	50
5648754	Indeno(1,2,3-cd)pyrene	2018/07/26	85	50 - 130	81	50 - 130	<0.010	mg/kg	NC	50
5648754	Naphthalene	2018/07/26	89	50 - 130	87	50 - 130	<0.010	mg/kg	NC	50
5648754	Perylene	2018/07/26	89	50 - 130	86	50 - 130	<0.010	mg/kg	NC	50
5648754	Phenanthrene	2018/07/26	97	50 - 130	92	50 - 130	<0.010	mg/kg	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5648754	Pyrene	2018/07/26	88	50 - 130	89	50 - 130	<0.010	mg/kg	NC	50
5648819	>C10-C16 Hydrocarbons	2018/07/28	NC	30 - 130	91	60 - 130	<10	mg/kg	14	50
5648819	>C16-C21 Hydrocarbons	2018/07/28	88	30 - 130	90	60 - 130	<10	mg/kg	6.4	50
5648819	>C21-<C32 Hydrocarbons	2018/07/28	110	30 - 130	122	60 - 130	<15	mg/kg	23	50
5648896	Aliphatic >C10-C12	2018/08/02			79	60 - 130	<8.0	mg/kg	12	50
5648896	Aliphatic >C12-C16	2018/08/02			76	60 - 130	<15	mg/kg	8.9	50
5648896	Aliphatic >C16-C21	2018/08/02			76	60 - 130	<15	mg/kg	21	50
5648896	Aliphatic >C21-<C32	2018/08/02			77	60 - 130	<15	mg/kg	9.8	50
5648896	Aromatic >C10-C12	2018/08/02			100	60 - 130	<4.0	mg/kg	42	50
5648896	Aromatic >C12-C16	2018/08/02			97	60 - 130	<15	mg/kg	39	50
5648896	Aromatic >C16-C21	2018/08/02			95	60 - 130	<15	mg/kg	28	50
5648896	Aromatic >C21-<C32	2018/08/02			92	60 - 130	<15	mg/kg	21	50
5649293	Aroclor 1016	2018/07/30					<0.050	ug/g	NC	50
5649293	Aroclor 1221	2018/07/30					<0.050	ug/g	NC	50
5649293	Aroclor 1232	2018/07/30					<0.050	ug/g	NC	50
5649293	Aroclor 1242	2018/07/30					<0.050	ug/g	NC	50
5649293	Aroclor 1248	2018/07/30					<0.050	ug/g	NC	50
5649293	Aroclor 1254	2018/07/30	80	70 - 130	106	70 - 130	<0.050	ug/g	NC	50
5649293	Aroclor 1260	2018/07/30					<0.050	ug/g	NC	50
5651062	Acid Extractable Aluminum (Al)	2018/07/27					<10	mg/kg	1.4	35
5651062	Acid Extractable Antimony (Sb)	2018/07/27	99	75 - 125	104	75 - 125	<2.0	mg/kg	NC	35
5651062	Acid Extractable Arsenic (As)	2018/07/27	98	75 - 125	100	75 - 125	<2.0	mg/kg	9.5	35
5651062	Acid Extractable Barium (Ba)	2018/07/27	NC	75 - 125	97	75 - 125	<5.0	mg/kg	25	35
5651062	Acid Extractable Beryllium (Be)	2018/07/27	94	75 - 125	94	75 - 125	<2.0	mg/kg	NC	35
5651062	Acid Extractable Bismuth (Bi)	2018/07/27	105	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35
5651062	Acid Extractable Boron (B)	2018/07/27	87	75 - 125	92	75 - 125	<50	mg/kg	NC	35
5651062	Acid Extractable Cadmium (Cd)	2018/07/27	101	75 - 125	103	75 - 125	<0.30	mg/kg	NC	35
5651062	Acid Extractable Chromium (Cr)	2018/07/27	94	75 - 125	97	75 - 125	<2.0	mg/kg	8.4	35
5651062	Acid Extractable Cobalt (Co)	2018/07/27	95	75 - 125	97	75 - 125	<1.0	mg/kg	7.3	35
5651062	Acid Extractable Copper (Cu)	2018/07/27	94	75 - 125	96	75 - 125	<2.0	mg/kg	30	35
5651062	Acid Extractable Iron (Fe)	2018/07/27					<50	mg/kg	8.8	35

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5651062	Acid Extractable Lead (Pb)	2018/07/27	99	75 - 125	105	75 - 125	<0.50	mg/kg	10	35
5651062	Acid Extractable Lithium (Li)	2018/07/27	100	75 - 125	99	75 - 125	<2.0	mg/kg	2.9	35
5651062	Acid Extractable Manganese (Mn)	2018/07/27	NC	75 - 125	99	75 - 125	<2.0	mg/kg	9.9	35
5651062	Acid Extractable Mercury (Hg)	2018/07/27	96	75 - 125	104	75 - 125	<0.10	mg/kg		
5651062	Acid Extractable Molybdenum (Mo)	2018/07/27	104	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35
5651062	Acid Extractable Nickel (Ni)	2018/07/27	93	75 - 125	98	75 - 125	<2.0	mg/kg	6.2	35
5651062	Acid Extractable Rubidium (Rb)	2018/07/27	99	75 - 125	101	75 - 125	<2.0	mg/kg	7.6	35
5651062	Acid Extractable Selenium (Se)	2018/07/27	99	75 - 125	99	75 - 125	<1.0	mg/kg	NC	35
5651062	Acid Extractable Silver (Ag)	2018/07/27	102	75 - 125	102	75 - 125	<0.50	mg/kg	NC	35
5651062	Acid Extractable Strontium (Sr)	2018/07/27	106	75 - 125	103	75 - 125	<5.0	mg/kg	7.4	35
5651062	Acid Extractable Thallium (Tl)	2018/07/27	103	75 - 125	104	75 - 125	<0.10	mg/kg	NC	35
5651062	Acid Extractable Tin (Sn)	2018/07/27	103	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35
5651062	Acid Extractable Uranium (U)	2018/07/27	101	75 - 125	103	75 - 125	<0.10	mg/kg	74 (2)	35
5651062	Acid Extractable Vanadium (V)	2018/07/27	94	75 - 125	99	75 - 125	<2.0	mg/kg	14	35
5651062	Acid Extractable Zinc (Zn)	2018/07/27	96	75 - 125	101	75 - 125	<5.0	mg/kg	2.8	35
5651384	Benzene	2018/07/27	72	60 - 130	99	60 - 140	<0.025	mg/kg	NC	50
5651384	C6 - C10 (less BTEX)	2018/07/27					<2.5	mg/kg	NC	50
5651384	Ethylbenzene	2018/07/27	75	60 - 130	89	60 - 140	<0.025	mg/kg	NC	50
5651384	Toluene	2018/07/27	77	60 - 130	88	60 - 140	<0.025	mg/kg	NC	50
5651384	Total Xylenes	2018/07/27	73	60 - 130	87	60 - 140	<0.050	mg/kg	NC	50
5658687	>C8-C10 Aromatics (-EX)	2018/08/02					<0.50	mg/kg		
5658687	Aliphatic >C6-C8	2018/08/02					<1.0	mg/kg		
5658687	Aliphatic >C8-C10	2018/08/02					<1.0	mg/kg		
5658687	Benzene	2018/08/02			107	60 - 140	<0.025	mg/kg		
5658687	Ethylbenzene	2018/08/02			107	60 - 140	<0.025	mg/kg		
5658687	Toluene	2018/08/02			106	60 - 140	<0.025	mg/kg		

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5658687	Total Xylenes	2018/08/02			105	60 - 140	<0.050	mg/kg		

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) PCB surrogate outside acceptance limits. No effect on data quality. Data accepted.

(2) Poor RPD due to sample inhomogeneity. Results verified by digestion extraction and analysis.

(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Maxxam Job #: B8I5460
Report Date: 2018/08/23

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Phil Deveau, Scientific Specialist (Organics)

Rosemarie MacDonald, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D 33422 Page 1 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	☒ Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive, St John's NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 5761458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		6.5, 6.9, 7.2	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Wall / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HCl04)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX, C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (PWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)	HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW32-GP01	2018/07/15		Soil																	X		X					
2	2018-MW32-GP02	↓		↓									X				X											
3	2018-MW32-GP09																											TPH fractionation
4	2018-BH9-GP05																X											
5	2018-MW42-GP01																X											
6	2018-MW42-GP02																				X							
7	2018-BH44-GP01																X						X					
8	2018-BH44-GP02												X															
9	2018-BH44-GP06																				X							
10	2018-BH45-GP01	↓		↓													X				X							Triple Silica Gel

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			Mark Hunter	2018/07/20	8:55	B8I5460

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CHAIN OF CUSTODY RECORD

COC #: D33400 Page 2 of 2

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive, St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@stantec.com	Email:	Site #:	
		Sampled By: AP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		6.5, 6.9, 7.2	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Présence/Absence)	Total Coliform/E.coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-BH45-GP02	2018/07/15		Soil									X															
2	2018-MW43-GP01	↓		↓									X				X											
3	2018-MW43-GP07																X				X							
4																												
5																												
6																												
7																												
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			[signature]	2018/07/20	8:55	B8I5460

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D 33409

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/24
Report #: R5371716
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I7049
Received: 2018/07/25, 09:12

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil)	3	N/A	2018/07/31	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	8	2018/07/30	2018/07/30	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	8	2018/07/30	2018/07/31	ATL SOP 00058	EPA 6020A R1 m
Moisture	9	N/A	2018/07/27	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	3	2018/07/30	2018/07/31	ATL SOP 00102	EPA 8270E 2017 m
PCBs in soil by GC/ECD (1)	1	2018/07/27	2018/07/31	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	1	N/A	2018/07/31	N/A	Auto Calc.
ModTPH (T1) Calc. for Soil	8	N/A	2018/07/31	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	8	N/A	2018/07/31	ATL SOP 00119	Atl. RBCA v3.1 m

Sample Matrix: Vegetation
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury (CVAA)	8	2018/08/09	2018/08/10	ATL SOP 00026	EPA 245.5 m
Metals in Terrestrial Biota	8	2018/08/03	2018/08/08	ATL SOP 00058	EPA 6020A R1 m
PCBs in soil by GC/ECD (1)	8	2018/08/02	2018/08/14	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil)	8	N/A	2018/08/14	N/A	Auto Calc.

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide	21	N/A	2018/07/31	N/A	SM 22 4500-CO2 D
Alkalinity	21	N/A	2018/07/30	ATL SOP 00013	EPA 310.2 R1974 m
Benzo(b/j)fluoranthene Sum (water)	10	N/A	2018/08/01	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (water)	3	N/A	2018/08/02	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (water)	8	N/A	2018/08/07	N/A	Auto Calc.
Chloride	21	N/A	2018/07/30	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	21	N/A	2018/07/30	ATL SOP 00020	SM 23 2120C m
Conductance - water	21	N/A	2018/07/30	ATL SOP 00004	SM 23 2510B m

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D 33409

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/24
Report #: R5371716
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I7049
Received: 2018/07/25, 09:12

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
TEH in Water (PIRI)	9	2018/07/28	2018/07/30	ATL SOP 00113	Atl. RBCA v3.1 m
TEH in Water (PIRI)	4	2018/07/28	2018/07/31	ATL SOP 00113	Atl. RBCA v3.1 m
TEH in Water (PIRI)	8	2018/07/28	2018/08/01	ATL SOP 00113	Atl. RBCA v3.1 m
Hardness (calculated as CaCO3)	15	N/A	2018/07/30	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	5	N/A	2018/07/31	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	1	N/A	2018/08/01	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (3)	9	N/A	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Metals Water Diss. MS (3)	5	N/A	2018/07/30	ATL SOP 00058	EPA 6020A R1 m
Metals Water Diss. MS (as rec'd)	6	N/A	2018/07/27	ATL SOP 00058	EPA 6020A R1 m
Metals Water Diss. MS (as rec'd)	1	N/A	2018/07/31	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference)	20	N/A	2018/07/31	N/A	Auto Calc.
Ion Balance (% Difference)	1	N/A	2018/08/01	N/A	Auto Calc.
Anion and Cation Sum	20	N/A	2018/07/31	N/A	Auto Calc.
Anion and Cation Sum	1	N/A	2018/08/01	N/A	Auto Calc.
Nitrogen Ammonia - water	12	N/A	2018/07/26	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	9	N/A	2018/07/30	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	21	N/A	2018/07/30	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	21	N/A	2018/07/30	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	21	N/A	2018/07/30	ATL SOP 00018	ASTM D3867-16
PAH in Water by GC/MS (SIM)	10	2018/07/25	2018/08/01	ATL SOP 00103	EPA 8270D 2014 m
PAH in Water by GC/MS (SIM)	4	2018/07/25	2018/08/03	ATL SOP 00103	EPA 8270D 2014 m
PAH in Water by GC/MS (SIM)	1	2018/07/25	2018/08/04	ATL SOP 00103	EPA 8270D 2014 m
PAH in Water by GC/MS (SIM)	3	2018/07/25	2018/08/07	ATL SOP 00103	EPA 8270D 2014 m
PAH in Water by GC/MS (SIM)	3	2018/07/26	2018/08/01	ATL SOP 00103	EPA 8270D 2014 m
PCBs in water by GC/ECD	10	2018/07/25	2018/07/31	ATL SOP 00107	EPA 8082A m
PCBs in water by GC/ECD	2	2018/07/25	2018/08/02	ATL SOP 00107	EPA 8082A m
PCBs in water by GC/ECD	5	2018/07/26	2018/07/31	ATL SOP 00107	EPA 8082A m
PCBs in water by GC/ECD	1	2018/07/26	2018/08/02	ATL SOP 00107	EPA 8082A m
PCBs in water by GC/ECD	3	2018/07/30	2018/08/01	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water)	15	N/A	2018/07/31	N/A	Auto Calc.

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A Bureau Veritas Group Company

Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D 33409

Attention: Jim Slade

Stantec Consulting Ltd
141 Kelsey Drive
St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/24
Report #: R5371716
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I7049
Received: 2018/07/25, 09:12

Sample Matrix: Water
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PCB Aroclor sum (water)	3	N/A	2018/08/01	N/A	Auto Calc.
PCB Aroclor sum (water)	3	N/A	2018/08/02	N/A	Auto Calc.
pH (4)	21	N/A	2018/07/30	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	21	N/A	2018/07/30	ATL SOP 00021	SM 23 4500-P E m
VPH in Water (PIRI)	12	N/A	2018/07/27	ATL SOP 00118	Atl. RBCA v3.1 m
VPH in Water (PIRI)	1	N/A	2018/07/28	ATL SOP 00118	Atl. RBCA v3.1 m
VPH in Water (PIRI)	7	N/A	2018/07/30	ATL SOP 00118	Atl. RBCA v3.1 m
VPH in Water (PIRI)	1	N/A	2018/08/01	ATL SOP 00118	Atl. RBCA v3.1 m
Sat. pH and Langelier Index (@ 20C)	20	N/A	2018/07/31	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	1	N/A	2018/08/01	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	20	N/A	2018/07/31	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2018/08/01	ATL SOP 00049	Auto Calc.
Reactive Silica	21	N/A	2018/07/30	ATL SOP 00022	EPA 366.0 m
Sulphate	21	N/A	2018/07/30	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	20	N/A	2018/07/31	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	1	N/A	2018/08/01	N/A	Auto Calc.
Organic carbon - Total (TOC) (5)	1	N/A	2018/07/27	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (5)	16	N/A	2018/07/28	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (5)	4	N/A	2018/07/30	ATL SOP 00203	SM 23 5310B m
ModTPH (T1) Calc. for Water	9	N/A	2018/07/31	N/A	Atl. RBCA v3 m
ModTPH (T1) Calc. for Water	12	N/A	2018/08/01	N/A	Atl. RBCA v3 m
Turbidity	10	N/A	2018/07/30	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	11	N/A	2018/07/31	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless

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Your Project #: 121414998
Site Location: BORDER BEACON
Your C.O.C. #: D 33409

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St. John's, NL
CANADA A1B 0L2

Report Date: 2018/08/24
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CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B8I7049
Received: 2018/07/25, 09:12

indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

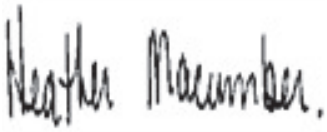
Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.
(3) Sample filtered in laboratory prior to analysis for dissolved metals.
(4) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(5) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key



Heather Macumber
Senior Project Manager
24 Aug 2018 15:55:23

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: HMacumber@maxxam.ca
Phone# (902)420-0203 Ext:226

==========

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

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HHQ398	HHQ400	HHQ402	HHQ403			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW49-GP01**	**2018-MW46-GP01**	**2018-MW47-GP01**	**2018-MW47-GP02**	**RDL**	**QC Batch**	**MDL**
Inorganics								
Moisture	%	12	3.8	1.9	13	1.0	5651288	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		HHQ404	HHQ405	HHQ407	HHQ408	HHQ409			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW47-GP06**	**2018-MW48-GP01**	**2018-MW48-GP06**	**2018-SS49**	**2018-SS50**	**RDL**	**QC Batch**	**MDL**
Inorganics									
Moisture	%	11	5.4	22	6.5	12	1.0	5651288	0.20

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHQ398	HHQ399	HHQ400	HHQ401			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW49-GP01**	**2018-MW49-GP02**	**2018-MW46-GP01**	**2018-MW46-GP04**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3900	3200	4100	3500	10	5654319	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Barium (Ba)	mg/kg	43	53	40	58	5.0	5654319	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5654319	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5654319	N/A
Acid Extractable Chromium (Cr)	mg/kg	6.0	5.0	5.4	4.3	2.0	5654319	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.6	2.4	2.8	2.5	1.0	5654319	N/A
Acid Extractable Copper (Cu)	mg/kg	5.9	4.8	5.3	5.9	2.0	5654319	N/A
Acid Extractable Iron (Fe)	mg/kg	11000	10000	12000	9900	50	5654319	N/A
Acid Extractable Lead (Pb)	mg/kg	4.6	4.2	5.4	4.3	0.50	5654319	N/A
Acid Extractable Lithium (Li)	mg/kg	8.3	7.6	10	8.3	2.0	5654319	N/A
Acid Extractable Manganese (Mn)	mg/kg	120	110	140	110	2.0	5654319	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654319	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Nickel (Ni)	mg/kg	3.9	3.7	3.9	3.7	2.0	5654319	N/A
Acid Extractable Rubidium (Rb)	mg/kg	6.4	4.9	5.3	5.6	2.0	5654319	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5654319	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5654319	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.4	6.8	5.9	6.7	5.0	5654319	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654319	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Uranium (U)	mg/kg	0.92	0.88	0.75	0.83	0.10	5654319	N/A
Acid Extractable Vanadium (V)	mg/kg	12	11	12	9.6	2.0	5654319	N/A
Acid Extractable Zinc (Zn)	mg/kg	27	24	35	24	5.0	5654319	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HHQ402	HHQ406	HHQ407	HHQ409			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW47-GP01**	**2018-MW48-GP02**	**2018-MW48-GP06**	**2018-SS50**	**RDL**	**QC Batch**	**MDL**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	3600	3600	2800	3500	10	5654319	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Barium (Ba)	mg/kg	39	27	34	11	5.0	5654319	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	5654319	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	5654319	N/A
Acid Extractable Chromium (Cr)	mg/kg	3.1	3.9	5.9	2.1	2.0	5654319	N/A
Acid Extractable Cobalt (Co)	mg/kg	2.0	1.8	1.5	<1.0	1.0	5654319	N/A
Acid Extractable Copper (Cu)	mg/kg	4.9	3.6	4.4	<2.0	2.0	5654319	N/A
Acid Extractable Iron (Fe)	mg/kg	9700	9700	8600	7300	50	5654319	N/A
Acid Extractable Lead (Pb)	mg/kg	6.6	5.7	4.0	4.0	0.50	5654319	N/A
Acid Extractable Lithium (Li)	mg/kg	11	10	8.5	3.3	2.0	5654319	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	110	100	38	2.0	5654319	N/A
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654319	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Nickel (Ni)	mg/kg	2.5	2.4	2.7	<2.0	2.0	5654319	N/A
Acid Extractable Rubidium (Rb)	mg/kg	5.7	5.1	4.7	3.8	2.0	5654319	N/A
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	5654319	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	5654319	N/A
Acid Extractable Strontium (Sr)	mg/kg	6.1	<5.0	<5.0	<5.0	5.0	5654319	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	5654319	N/A
Acid Extractable Tin (Sn)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	5654319	N/A
Acid Extractable Uranium (U)	mg/kg	0.70	0.66	0.82	0.22	0.10	5654319	N/A
Acid Extractable Vanadium (V)	mg/kg	6.9	6.9	6.8	6.3	2.0	5654319	N/A
Acid Extractable Zinc (Zn)	mg/kg	32	26	27	9.1	5.0	5654319	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		HHQ403	HHQ404	HHQ408			
Sampling Date		2018/07/17	2018/07/17	2018/07/19			
COC Number		D 33409	D 33409	D 33409			
	UNITS	**2018-MW47-GP02**	**2018-MW47-GP06**	**2018-SS49**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
2-Methylnaphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Acenaphthene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Acenaphthylene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(a)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(a)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	<0.020	0.020	5646543	N/A
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Chrysene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Fluoranthene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Fluorene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Naphthalene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Perylene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Phenanthrene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Pyrene	mg/kg	<0.010	<0.010	<0.010	0.010	5654222	N/A
Surrogate Recovery (%)							
D10-Anthracene	%	108	104	103		5654222	
D14-Terphenyl (FS)	%	95	94	95		5654222	
D8-Acenaphthylene	%	106	102	105		5654222	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHQ398	HHQ400	HHQ402	HHQ404			
Sampling Date		2018/07/17	2018/07/17	2018/07/17	2018/07/17			
COC Number		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW49-GP01**	**2018-MW46-GP01**	**2018-MW47-GP01**	**2018-MW47-GP06**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5654231	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	2.5	5654231	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	5654203	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	5654203	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	<15	15	5654203	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	<15	<15	15	5647027	N/A
Reached Baseline at C32	mg/kg	NA	NA	NA	NA	N/A	5654203	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	NA	NA	N/A	5654203	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	94	93	96	96		5654203	
n-Dotriacontane - Extractable	%	104	106	108	102		5654203	
Isobutylbenzene - Volatile	%	107	95	100	90		5654231	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		HHQ405	HHQ407	HHQ408	HHQ409			
Sampling Date		2018/07/17	2018/07/17	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW48-GP01**	**2018-MW48-GP06**	**2018-SS49**	**2018-SS50**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons								
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	N/A
Toluene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	N/A
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	5654231	0.025
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	5654231	N/A
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	2.5	5654231	N/A
>C10-C16 Hydrocarbons	mg/kg	<10	<10	50	<10	10	5654203	N/A
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	5654203	N/A
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	17	15	5654203	N/A
Modified TPH (Tier1)	mg/kg	<15	<15	50	17	15	5647027	N/A
Reached Baseline at C32	mg/kg	NA	NA	Yes	Yes	N/A	5654203	N/A
Hydrocarbon Resemblance	mg/kg	NA	NA	COMMENT (1)	COMMENT (2)	N/A	5654203	N/A
Surrogate Recovery (%)								
Isobutylbenzene - Extractable	%	94	96	95	91		5654203	
n-Dotriacontane - Extractable	%	100	109	104	96		5654203	
Isobutylbenzene - Volatile	%	95 (3)	104	103	97		5654231	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) One product in fuel oil range.
(2) Unidentified compound(s) in lube oil range.
(3) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

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Stantec Consulting Ltd
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Sampler Initials: AP

POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

Maxxam ID		HHQ405			
Sampling Date		2018/07/17			
COC Number		D 33409			
	UNITS	**2018-MW48-GP01**	**RDL**	**QC Batch**	**MDL**
PCBs					
Aroclor 1016	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1221	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1232	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1248	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1242	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1254	ug/g	<0.050	0.050	5652352	N/A
Aroclor 1260	ug/g	<0.050	0.050	5652352	N/A
Calculated Total PCB	ug/g	<0.050	0.050	5647009	N/A
Surrogate Recovery (%)					
Decachlorobiphenyl	%	91		5652352	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Sampler Initials: AP

MERCURY BY COLD VAPOUR AA (VEGETATION)

Maxxam ID		HHQ431	HHQ432	HHQ433	HHQ434	HHQ435	HHQ436			
Sampling Date		2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2019-VEG01**	**2019-VEG02**	**2019-VEG03**	**2019-VEG04**	**2019-VEG05**	**2019-VEG06**	**RDL**	**QC Batch**	**MDL**
Metals										
Mercury (Hg)	mg/kg	<0.030 (1)	<0.030 (1)	<0.030 (1)	<0.030 (1)	<0.030 (1)	<0.030 (1)	0.030	5671323	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated RDL due to sample matrix.

Maxxam ID		HHQ437	HHQ438			
Sampling Date		2018/07/19	2018/07/19			
COC Number		D 33409	D 33409			
	UNITS	**2019-VEG07**	**2019-VEG08**	**RDL**	**QC Batch**	**MDL**
Metals						
Mercury (Hg)	mg/kg	<0.030 (1)	<0.030 (1)	0.030	5671351	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated RDL due to sample matrix.

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Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Maxxam ID		HHQ431	HHQ432	HHQ433	HHQ434	HHQ435	HHQ436			
Sampling Date		2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2019-VEG01**	**2019-VEG02**	**2019-VEG03**	**2019-VEG04**	**2019-VEG05**	**2019-VEG06**	**RDL**	**QC Batch**	**MDL**
Metals										
Acid Extractable Aluminum (Al)	mg/kg	15	110	120	12	<10	49	10	5662843	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Barium (Ba)	mg/kg	26	110	64	38	28	28	5.0	5662843	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Boron (B)	mg/kg	29	5.7	11	30	7.1	18	5.0	5662843	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	5662843	N/A
Acid Extractable Chromium (Cr)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Cobalt (Co)	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5662843	N/A
Acid Extractable Copper (Cu)	mg/kg	8.9	5.6	5.2	9.6	9.2	18	2.0	5662843	N/A
Acid Extractable Iron (Fe)	mg/kg	79	160	99	62	64	130	50	5662843	N/A
Acid Extractable Lead (Pb)	mg/kg	<0.50	1.8	0.68	1.2	0.56	0.85	0.50	5662843	N/A
Acid Extractable Lithium (Li)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Manganese (Mn)	mg/kg	79	370	150	210	590	300	2.0	5662843	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Nickel (Ni)	mg/kg	<2.0	3.3	2.1	2.1	3.4	5.0	2.0	5662843	N/A
Acid Extractable Selenium (Se)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5662843	N/A
Acid Extractable Strontium (Sr)	mg/kg	20	23	25	10	11	14	5.0	5662843	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5662843	N/A
Acid Extractable Uranium (U)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5662843	N/A
Acid Extractable Vanadium (V)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Zinc (Zn)	mg/kg	94	70	120	240	270	52	5.0	5662843	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Maxxam ID		HHQ437	HHQ438	HHQ438			
Sampling Date		2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409			
	UNITS	**2019-VEG07**	**2019-VEG08**	**2019-VEG08 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Metals							
Acid Extractable Aluminum (Al)	mg/kg	68	58	57	10	5662843	N/A
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Barium (Ba)	mg/kg	43	18	18	5.0	5662843	N/A
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Boron (B)	mg/kg	9.3	7.3	7.5	5.0	5662843	N/A
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	0.30	5662843	N/A
Acid Extractable Chromium (Cr)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Cobalt (Co)	mg/kg	<1.0	<1.0	<1.0	1.0	5662843	N/A
Acid Extractable Copper (Cu)	mg/kg	8.3	9.1	9.1	2.0	5662843	N/A
Acid Extractable Iron (Fe)	mg/kg	130	130	120	50	5662843	N/A
Acid Extractable Lead (Pb)	mg/kg	11	<0.50	0.68	0.50	5662843	N/A
Acid Extractable Lithium (Li)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Manganese (Mn)	mg/kg	130	600	600	2.0	5662843	N/A
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Nickel (Ni)	mg/kg	2.4	2.9	2.8	2.0	5662843	N/A
Acid Extractable Selenium (Se)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	5662843	N/A
Acid Extractable Strontium (Sr)	mg/kg	12	7.4	7.0	5.0	5662843	N/A
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	0.10	5662843	N/A
Acid Extractable Uranium (U)	mg/kg	<0.10	<0.10	<0.10	0.10	5662843	N/A
Acid Extractable Vanadium (V)	mg/kg	<2.0	<2.0	<2.0	2.0	5662843	N/A
Acid Extractable Zinc (Zn)	mg/kg	97	150	150	5.0	5662843	N/A

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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POLYCHLORINATED BIPHENYLS BY GC-ECD (VEGETATION)

Maxxam ID		HHQ431	HHQ432	HHQ433	HHQ434	HHQ435	HHQ436			
Sampling Date		2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2019-VEG01**	**2019-VEG02**	**2019-VEG03**	**2019-VEG04**	**2019-VEG05**	**2019-VEG06**	**RDL**	**QC Batch**	**MDL**
PCBs										
Aroclor 1016	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1221	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1232	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1248	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1242	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1254	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1260	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5676113	N/A
Calculated Total PCB	ug/g	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.25	5647009	N/A
Surrogate Recovery (%)										
Decachlorobiphenyl	%	96 (1)	96 (1)	95 (1)	93 (1)	112 (1)	97 (1)		5676113	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PCB RDL due to limited sample.

Maxxam ID		HHQ437	HHQ438			
Sampling Date		2018/07/19	2018/07/19			
COC Number		D 33409	D 33409			
	UNITS	**2019-VEG07**	**2019-VEG08**	**RDL**	**QC Batch**	**MDL**
PCBs						
Aroclor 1016	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1221	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1232	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1248	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1242	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1254	ug/g	<0.25	<0.25	0.25	5676113	N/A
Aroclor 1260	ug/g	<0.25	<0.25	0.25	5676113	N/A
Calculated Total PCB	ug/g	<0.25	<0.25	0.25	5647009	N/A
Surrogate Recovery (%)						
Decachlorobiphenyl	%	93 (1)	96 (1)		5676113	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PCB RDL due to limited sample.

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Sampler Initials: AP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ410				HHQ410			
Sampling Date		2018/07/18				2018/07/18			
COC Number		D 33409				D 33409			
	UNITS	**2018-MW01**	**RDL**	**QC Batch**	**MDL**	**2018-MW01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters									
Anion Sum	me/L	0.290	N/A	5646258	N/A				
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	11	1.0	5646254	0.20				
Calculated TDS	mg/L	22	1.0	5646263	0.20				
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5646254	0.20				
Cation Sum	me/L	0.320	N/A	5646258	N/A				
Hardness (CaCO3)	mg/L	11	1.0	5646256	1.0				
Ion Balance (% Difference)	%	4.92	N/A	5646257	N/A				
Langelier Index (@ 20C)	N/A	-2.72		5646261					
Langelier Index (@ 4C)	N/A	-2.97		5646262					
Nitrate (N)	mg/L	0.074	0.050	5646259	N/A				
Saturation pH (@ 20C)	N/A	9.74		5646261					
Saturation pH (@ 4C)	N/A	9.99		5646262					
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	11	5.0	5651597	N/A				
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651613	N/A				
Colour	TCU	<5.0	5.0	5651622	N/A				
Nitrate + Nitrite (N)	mg/L	0.074	0.050	5651624	N/A				
Nitrite (N)	mg/L	<0.010	0.010	5651633	N/A				
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5654308	N/A	<0.050	0.050	5654308	N/A
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	5651958	N/A				
Orthophosphate (P)	mg/L	<0.010	0.010	5651623	N/A				
pH	pH	7.02	N/A	5654854	N/A				
Reactive Silica (SiO2)	mg/L	6.1	0.50	5651620	N/A				
Dissolved Sulphate (SO4)	mg/L	2.6	2.0	5651619	N/A				
Turbidity	NTU	100	1.0	5656231	0.10				
Conductivity	uS/cm	31	1.0	5654864	N/A				

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ411			HHQ412				HHQ412			
Sampling Date		2018/07/18			2018/07/18				2018/07/18			
COC Number		D 33409			D 33409				D 33409			
	UNITS	**2018-MW18**	**RDL**	**QC Batch**	**2018-MW50**	**RDL**	**QC Batch**	**MDL**	**2018-MW50 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters												
Anion Sum	me/L	0.260	N/A	5646258	0.170	N/A	5646258	N/A				
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	10	1.0	5646254	5.2	1.0	5646254	0.20				
Calculated TDS	mg/L	23	1.0	5646263	14	1.0	5646263	0.20				
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5646254	<1.0	1.0	5646254	0.20				
Cation Sum	me/L	0.260	N/A	5646258	0.110	N/A	5646258	N/A				
Hardness (CaCO3)	mg/L	11	1.0	5646256	3.9	1.0	5646256	1.0				
Ion Balance (% Difference)	%	0.00	N/A	5646257	21.4	N/A	5646257	N/A				
Langelier Index (@ 20C)	N/A	-3.28		5646261	-4.41		5646261					
Langelier Index (@ 4C)	N/A	-3.54		5646262	-4.67		5646262					
Nitrate (N)	mg/L	<0.050	0.050	5646259	<0.050	0.050	5646259	N/A				
Saturation pH (@ 20C)	N/A	9.79		5646261	10.4		5646261					
Saturation pH (@ 4C)	N/A	10.0		5646262	10.7		5646262					
Inorganics												
Total Alkalinity (Total as CaCO3)	mg/L	10	5.0	5651597	5.2	5.0	5651597	N/A	5.0	5.0	5651597	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651613	<1.0	1.0	5651613	N/A	<1.0	1.0	5651613	N/A
Colour	TCU	<5.0	5.0	5651622	6.6	5.0	5651622	N/A	7.5	5.0	5651622	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	5651624	<0.050	0.050	5651624	N/A	<0.050	0.050	5651624	N/A
Nitrite (N)	mg/L	<0.010	0.010	5651633	<0.010	0.010	5651633	N/A	<0.010	0.010	5651633	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5649292	<0.050	0.050	5654308	N/A				
Total Organic Carbon (C)	mg/L	4.6	0.50	5651964	9.5 (1)	5.0	5651958	N/A				
Orthophosphate (P)	mg/L	<0.010	0.010	5651623	<0.010	0.010	5651623	N/A	<0.010	0.010	5651623	N/A
pH	pH	6.50	N/A	5654854	6.03	N/A	5654854	N/A				
Reactive Silica (SiO2)	mg/L	8.6	0.50	5651620	5.3	0.50	5651620	N/A	5.4	0.50	5651620	N/A
Dissolved Sulphate (SO4)	mg/L	2.6	2.0	5651619	3.1	2.0	5651619	N/A	3.1	2.0	5651619	N/A
Turbidity	NTU	69	0.10	5656231	200	1.0	5656231	0.10				
Conductivity	uS/cm	25	1.0	5654864	19	1.0	5654864	N/A				

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ413			HHQ414			HHQ415			
Sampling Date		2018/07/18			2018/07/18			2018/07/18			
COC Number		D 33409			D 33409			D 33409			
	UNITS	**2018-MW17**	**RDL**	**QC Batch**	**2018-MW14**	**RDL**	**QC Batch**	**2018-MW09**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters											
Anion Sum	me/L	0.410	N/A	5646258	0.660	N/A	5646258	0.290	N/A	5647163	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	20	1.0	5646254	23	1.0	5646254	8.3	1.0	5647147	0.20
Calculated TDS	mg/L	29	1.0	5646263	50	1.0	5646263	25	1.0	5647174	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5646254	<1.0	1.0	5646254	<1.0	1.0	5647147	0.20
Cation Sum	me/L	0.190	N/A	5646258	0.500	N/A	5646258	0.290	N/A	5647163	N/A
Hardness (CaCO3)	mg/L	7.2	1.0	5646256	19	1.0	5646256	9.1	1.0	5647152	1.0
Ion Balance (% Difference)	%	36.7	N/A	5646257	13.8	N/A	5646257	0.00	N/A	5647160	N/A
Langelier Index (@ 20C)	N/A	-2.93		5646261	-2.49		5646261	-2.94		5647170	
Langelier Index (@ 4C)	N/A	-3.18		5646262	-2.74		5646262	-3.19		5647172	
Nitrate (N)	mg/L	<0.050	0.050	5646259	<0.050	0.050	5646259	0.64	0.050	5647168	N/A
Saturation pH (@ 20C)	N/A	9.68		5646261	9.24		5646261	9.89		5647170	
Saturation pH (@ 4C)	N/A	9.93		5646262	9.49		5646262	10.1		5647172	
Inorganics											
Total Alkalinity (Total as CaCO3)	mg/L	20	5.0	5651597	23	5.0	5651597	8.3	5.0	5651597	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651613	1.0	1.0	5651613	<1.0	1.0	5651613	N/A
Colour	TCU	11	5.0	5651622	7.9	5.0	5651622	<5.0	5.0	5651622	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	5651624	<0.050	0.050	5651624	0.64	0.050	5651624	N/A
Nitrite (N)	mg/L	<0.010	0.010	5651633	<0.010	0.010	5651633	<0.010	0.010	5651633	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5649292	<0.050	0.050	5649292	<0.050	0.050	5654308	N/A
Total Organic Carbon (C)	mg/L	16 (1)	5.0	5651942	4.4	0.50	5654206	<5.0 (1)	5.0	5651958	N/A
Orthophosphate (P)	mg/L	<0.010	0.010	5651623	<0.010	0.010	5651623	<0.010	0.010	5651623	N/A
pH	pH	6.75	N/A	5654854	6.75	N/A	5654854	6.95	N/A	5654871	N/A
Reactive Silica (SiO2)	mg/L	13	0.50	5651620	16	0.50	5651620	7.3	0.50	5651620	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	5651619	8.9	2.0	5651619	3.7	2.0	5651619	N/A
Turbidity	NTU	230	1.0	5656231	56	0.10	5656231	210	1.0	5654201	0.10
Conductivity	uS/cm	47	1.0	5654864	68	1.0	5654864	32	1.0	5654873	N/A

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(1) Elevated reporting limit due to turbidity.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ416			HHQ417		HHQ418			
Sampling Date		2018/07/18			2018/07/18		2018/07/18			
COC Number		D 33409			D 33409		D 33409			
	UNITS	**2018-MW11**	**RDL**	**QC Batch**	**2018-MW20**	**QC Batch**	**2018-MW26**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters										
Anion Sum	me/L	2.65	N/A	5647163	0.400	5646258	0.350	N/A	5646258	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5647147	17	5646254	17	1.0	5646254	0.20
Calculated TDS	mg/L	150	1.0	5647174	31	5646263	25	1.0	5646263	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5647147	<1.0	5646254	<1.0	1.0	5646254	0.20
Cation Sum	me/L	2.15	N/A	5647163	0.360	5646258	0.220	N/A	5646258	N/A
Hardness (CaCO3)	mg/L	13	1.0	5647152	14	5646256	7.9	1.0	5646256	1.0
Ion Balance (% Difference)	%	10.4	N/A	5647160	5.26	5646257	22.8	N/A	5646257	N/A
Langelier Index (@ 20C)	N/A	NC		5647170	-2.48	5646261	-2.99		5646261	
Langelier Index (@ 4C)	N/A	NC		5647172	-2.73	5646262	-3.25		5646262	
Nitrate (N)	mg/L	0.17	0.050	5647168	<0.050	5646259	<0.050	0.050	5646259	N/A
Saturation pH (@ 20C)	N/A	NC		5647170	9.42	5646261	9.72		5646261	
Saturation pH (@ 4C)	N/A	NC		5647172	9.67	5646262	9.97		5646262	
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	<5.0	5.0	5651639	17	5651639	17	5.0	5651639	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651644	<1.0	5651644	<1.0	1.0	5651644	N/A
Colour	TCU	<5.0	5.0	5651651	7.1	5651651	6.7	5.0	5651651	N/A
Nitrate + Nitrite (N)	mg/L	0.17	0.050	5651654	<0.050	5651654	<0.050	0.050	5651654	N/A
Nitrite (N)	mg/L	<0.010	0.010	5651658	<0.010	5651658	<0.010	0.010	5651658	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5654308	<0.050	5649292	<0.050	0.050	5654308	N/A
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	5651958	14 (1)	5654206	6.1 (1)	5.0	5654206	N/A
Orthophosphate (P)	mg/L	0.088	0.010	5651653	<0.010	5651653	<0.010	0.010	5651653	N/A
pH	pH	2.75 (2)	N/A	5654854	6.94	5654871	6.73	N/A	5654854	N/A
Reactive Silica (SiO2)	mg/L	11	0.50	5651647	10	5651647	9.8	0.50	5651647	N/A
Dissolved Sulphate (SO4)	mg/L	130	10	5651645	2.5	5651645	<2.0	2.0	5651645	N/A
Turbidity	NTU	160	1.0	5654190	>1000	5656231	330	1.0	5654190	0.10
Conductivity	uS/cm	840	1.0	5654864	40	5654873	29	1.0	5654864	N/A

RDL = Reportable Detection Limit
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(1) Elevated reporting limit due to turbidity.
(2) pH: linear range exceedance. Extended linearity confirmed.

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RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ419		HHQ420		HHQ421			
Sampling Date		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW27**	**QC Batch**	**2018-MW31**	**QC Batch**	**2018-MW32**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters									
Anion Sum	me/L	0.340	5646258	0.810	5646258	0.390	N/A	5646258	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	17	5646254	40	5646254	19	1.0	5646254	0.20
Calculated TDS	mg/L	29	5646263	60	5646263	30	1.0	5646263	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5646254	<1.0	5646254	<1.0	1.0	5646254	0.20
Cation Sum	me/L	0.370	5646258	0.870	5646258	0.380	N/A	5646258	N/A
Hardness (CaCO3)	mg/L	15	5646256	36	5646256	16	1.0	5646256	1.0
Ion Balance (% Difference)	%	4.23	5646257	3.57	5646257	1.30	N/A	5646257	N/A
Langelier Index (@ 20C)	N/A	-2.81	5646261	-2.09	5646261	-2.71		5646261	
Langelier Index (@ 4C)	N/A	-3.07	5646262	-2.34	5646262	-2.96		5646262	
Nitrate (N)	mg/L	<0.050	5646259	<0.050	5646259	<0.050	0.050	5646259	N/A
Saturation pH (@ 20C)	N/A	9.46	5646261	8.75	5646261	9.36		5646261	
Saturation pH (@ 4C)	N/A	9.71	5646262	9.00	5646262	9.62		5646262	
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	17	5651639	40	5651639	19	5.0	5651639	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	5651644	<1.0	5651644	<1.0	1.0	5651644	N/A
Colour	TCU	5.3	5651651	36	5651651	7.8	5.0	5651651	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	5651654	<0.050	5651654	<0.050	0.050	5651654	N/A
Nitrite (N)	mg/L	<0.010	5651658	<0.010	5651658	<0.010	0.010	5651658	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	5654308	<0.050	5649292	<0.050	0.050	5649292	N/A
Total Organic Carbon (C)	mg/L	8.8 (1)	5651958	23 (1)	5651964	8.0 (1)	5.0	5654206	N/A
Orthophosphate (P)	mg/L	<0.010	5651653	<0.010	5651653	<0.010	0.010	5651653	N/A
pH	pH	6.65	5654854	6.66	5654854	6.65	N/A	5654854	N/A
Reactive Silica (SiO2)	mg/L	11	5651647	18	5651647	11	0.50	5651647	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	5651645	<2.0	5651645	<2.0	2.0	5651645	N/A
Turbidity	NTU	270	5654190	110	5656231	150	1.0	5654201	0.10
Conductivity	uS/cm	33	5654864	82	5654864	40	1.0	5654864	N/A

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RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ422			HHQ423				HHQ423			
Sampling Date		2018/07/19			2018/07/19				2018/07/19			
COC Number		D 33409			D 33409				D 33409			
	UNITS	**2018-MW43**	**RDL**	**QC Batch**	**2018-MW41**	**RDL**	**QC Batch**	**MDL**	**2018-MW41 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters												
Anion Sum	me/L	0.200	N/A	5646258	0.180	N/A	5647163	N/A				
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	9.6	1.0	5646254	5.5	1.0	5647147	0.20				
Calculated TDS	mg/L	14	1.0	5646263	15	1.0	5647174	0.20				
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5646254	<1.0	1.0	5647147	0.20				
Cation Sum	me/L	0.190	N/A	5646258	0.150	N/A	5647163	N/A				
Hardness (CaCO3)	mg/L	6.4	1.0	5646256	5.4	1.0	5647152	1.0				
Ion Balance (% Difference)	%	2.56	N/A	5646257	9.09	N/A	5647160	N/A				
Langelier Index (@ 20C)	N/A	-3.22		5646261	-3.73		5647170					
Langelier Index (@ 4C)	N/A	-3.48		5646262	-3.98		5647172					
Nitrate (N)	mg/L	0.084	0.050	5646259	0.25	0.050	5647168	N/A				
Saturation pH (@ 20C)	N/A	9.99		5646261	10.3		5647170					
Saturation pH (@ 4C)	N/A	10.2		5646262	10.6		5647172					
Inorganics												
Total Alkalinity (Total as CaCO3)	mg/L	9.6	5.0	5651639	5.5	5.0	5651639	N/A				
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651644	<1.0	1.0	5651644	N/A				
Colour	TCU	<5.0	5.0	5651651	<5.0	5.0	5651651	N/A				
Nitrate + Nitrite (N)	mg/L	0.084	0.050	5651654	0.25	0.050	5651654	N/A				
Nitrite (N)	mg/L	<0.010	0.010	5651658	<0.010	0.010	5651658	N/A				
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5649292	<0.050	0.050	5649292	N/A				
Total Organic Carbon (C)	mg/L	7.3 (1)	5.0	5651964	0.84	0.50	5651429	N/A	0.83	0.50	5651429	N/A
Orthophosphate (P)	mg/L	<0.010	0.010	5651653	<0.010	0.010	5651653	N/A				
pH	pH	6.77	N/A	5654871	6.59	N/A	5654871	N/A				
Reactive Silica (SiO2)	mg/L	4.1	0.50	5651647	4.8	0.50	5651647	N/A				
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	5651645	2.4	2.0	5651645	N/A				
Turbidity	NTU	600	1.0	5656231	58	0.10	5654190	0.10				
Conductivity	uS/cm	19	1.0	5654873	19	1.0	5654873	N/A				

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RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ424		HHQ425		HHQ426			
Sampling Date		2018/07/19		2018/07/19		2018/07/19			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW39**	**QC Batch**	**2018-MW37**	**QC Batch**	**2018-MW34**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters									
Anion Sum	me/L	0.00	5647163	0.00	5646258	0.130	N/A	5646258	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5647147	<1.0	5646254	6.4	1.0	5646254	0.20
Calculated TDS	mg/L	3.0	5647174	3.0	5646263	8.0	1.0	5646263	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5647147	<1.0	5646254	<1.0	1.0	5646254	0.20
Cation Sum	me/L	0.0300	5647163	0.0400	5646258	0.100	N/A	5646258	N/A
Hardness (CaCO3)	mg/L	<1.0	5647152	1.1	5646256	2.6	1.0	5646256	1.0
Ion Balance (% Difference)	%	100	5647160	100	5646257	13.0	N/A	5646257	N/A
Langelier Index (@ 20C)	N/A	NC	5647170	NC	5646261	-4.34		5646261	
Langelier Index (@ 4C)	N/A	NC	5647172	NC	5646262	-4.60		5646262	
Nitrate (N)	mg/L	<0.050	5647168	<0.050	5646259	<0.050	0.050	5646259	N/A
Saturation pH (@ 20C)	N/A	NC	5647170	NC	5646261	10.6		5646261	
Saturation pH (@ 4C)	N/A	NC	5647172	NC	5646262	10.8		5646262	
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	<5.0	5651639	<5.0	5651639	6.4	5.0	5651639	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	5651644	<1.0	5651644	<1.0	1.0	5651644	N/A
Colour	TCU	5.6	5651651	<5.0	5651651	8.0	5.0	5651651	N/A
Nitrate + Nitrite (N)	mg/L	<0.050	5651654	<0.050	5651654	<0.050	0.050	5651654	N/A
Nitrite (N)	mg/L	<0.010	5651658	0.012	5651658	<0.010	0.010	5651658	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	5649292	<0.050	5649292	0.060	0.050	5654308	N/A
Total Organic Carbon (C)	mg/L	<50 (1)	5651958	<50 (1)	5651942	81 (1)	50	5651958	N/A
Orthophosphate (P)	mg/L	<0.010	5651653	<0.010	5651653	<0.010	0.010	5651653	N/A
pH	pH	5.84	5654854	6.03	5654871	6.24	N/A	5654854	N/A
Reactive Silica (SiO2)	mg/L	2.3	5651647	2.1	5651647	2.3	0.50	5651647	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	5651645	<2.0	5651645	<2.0	2.0	5651645	N/A
Turbidity	NTU	>1000	5654201	>1000	5654201	>1000	1.0	5656231	0.10
Conductivity	uS/cm	6.3	5654864	9.3	5654873	11	1.0	5654864	N/A

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ427		HHQ428		HHQ429			
Sampling Date		2018/07/19		2018/07/19		2018/07/19			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW33**	**QC Batch**	**2018-MW46**	**QC Batch**	**2018-MW47**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters									
Anion Sum	me/L	0.00	5646258	0.240	5646258	0.150	N/A	5646258	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5646254	8.7	5646254	7.2	1.0	5646254	0.20
Calculated TDS	mg/L	4.0	5646263	20	5646263	13	1.0	5646263	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5646254	<1.0	5646254	<1.0	1.0	5646254	0.20
Cation Sum	me/L	0.100	5646258	0.220	5646258	0.130	N/A	5646258	N/A
Hardness (CaCO3)	mg/L	3.3	5646256	7.0	5646256	4.1	1.0	5646256	1.0
Ion Balance (% Difference)	%	100	5646257	4.35	5646257	7.14	N/A	5646257	N/A
Langelier Index (@ 20C)	N/A	NC	5646261	-3.16	5646261	-3.36		5646261	
Langelier Index (@ 4C)	N/A	NC	5646262	-3.41	5646262	-3.61		5646262	
Nitrate (N)	mg/L	0.055	5646259	0.28	5646259	0.085	0.050	5646259	N/A
Saturation pH (@ 20C)	N/A	NC	5646261	9.98	5646261	10.3		5646261	
Saturation pH (@ 4C)	N/A	NC	5646262	10.2	5646262	10.5		5646262	
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	<5.0	5651639	8.7	5651639	7.3	5.0	5651639	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	5651644	<1.0	5651644	<1.0	1.0	5651644	N/A
Colour	TCU	<5.0	5651651	<5.0	5651651	<5.0	5.0	5651651	N/A
Nitrate + Nitrite (N)	mg/L	0.055	5651654	0.28	5651654	0.085	0.050	5651654	N/A
Nitrite (N)	mg/L	<0.010	5651658	<0.010	5651658	<0.010	0.010	5651658	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	5654308	<0.050	5649292	<0.050	0.050	5649292	N/A
Total Organic Carbon (C)	mg/L	5.3 (1)	5651958	<5.0 (1)	5651964	<5.0 (1)	5.0	5651964	N/A
Orthophosphate (P)	mg/L	<0.010	5651653	<0.010	5651653	<0.010	0.010	5651653	N/A
pH	pH	6.55	5654871	6.82	5654854	6.92	N/A	5654854	N/A
Reactive Silica (SiO2)	mg/L	1.7	5651647	6.1	5651647	5.8	0.50	5651647	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	5651645	2.5	5651645	<2.0	2.0	5651645	N/A
Turbidity	NTU	480	5654201	>1000	5654190	>1000	1.0	5656231	0.10
Conductivity	uS/cm	11	5654873	24	5654864	17	1.0	5654864	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to turbidity.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

RESULTS OF ANALYSES OF WATER

Maxxam ID		HHQ430			
Sampling Date		2018/07/19			
COC Number		D 33409			
	UNITS	**2018-MW68**	**RDL**	**QC Batch**	**MDL**
Calculated Parameters					
Anion Sum	me/L	0.130	N/A	5646258	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	6.1	1.0	5646254	0.20
Calculated TDS	mg/L	12	1.0	5646263	0.20
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5646254	0.20
Cation Sum	me/L	0.130	N/A	5646258	N/A
Hardness (CaCO3)	mg/L	4.3	1.0	5646256	1.0
Ion Balance (% Difference)	%	0.00	N/A	5646257	N/A
Langelier Index (@ 20C)	N/A	-3.45		5646261	
Langelier Index (@ 4C)	N/A	-3.71		5646262	
Nitrate (N)	mg/L	0.094	0.050	5646259	N/A
Saturation pH (@ 20C)	N/A	10.3		5646261	
Saturation pH (@ 4C)	N/A	10.6		5646262	
Inorganics					
Total Alkalinity (Total as CaCO3)	mg/L	6.1	5.0	5651639	N/A
Dissolved Chloride (Cl-)	mg/L	<1.0	1.0	5651644	N/A
Colour	TCU	<5.0	5.0	5651651	N/A
Nitrate + Nitrite (N)	mg/L	0.094	0.050	5651654	N/A
Nitrite (N)	mg/L	<0.010	0.010	5651658	N/A
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	5654308	N/A
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	5651958	N/A
Orthophosphate (P)	mg/L	<0.010	0.010	5651653	N/A
pH	pH	6.87	N/A	5654854	N/A
Reactive Silica (SiO2)	mg/L	4.9	0.50	5651647	N/A
Dissolved Sulphate (SO4)	mg/L	<2.0	2.0	5651645	N/A
Turbidity	NTU	400	1.0	5656231	0.10
Conductivity	uS/cm	13	1.0	5654864	N/A

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Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHQ410	HHQ411		HHQ412	HHQ413		HHQ414			
Sampling Date		2018/07/18	2018/07/18		2018/07/18	2018/07/18		2018/07/18			
COC Number		D 33409	D 33409		D 33409	D 33409		D 33409			
	UNITS	**2018-MW01**	**2018-MW18**	**QC Batch**	**2018-MW50**	**2018-MW17**	**QC Batch**	**2018-MW14**	**RDL**	**QC Batch**	**MDL**
Metals											
Dissolved Aluminum (Al)	ug/L	330	18	5651174	67	130	5651335	15	5.0	5651174	N/A
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	5651335	<1.0	1.0	5651174	N/A
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	5651335	<1.0	1.0	5651174	N/A
Dissolved Barium (Ba)	ug/L	34	39	5651174	49	73	5651335	61	1.0	5651174	N/A
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	5651335	<1.0	1.0	5651174	N/A
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	5651335	<2.0	2.0	5651174	N/A
Dissolved Boron (B)	ug/L	<50	<50	5651174	<50	<50	5651335	<50	50	5651174	N/A
Dissolved Cadmium (Cd)	ug/L	<0.010	0.017	5651174	0.028	0.050	5651335	0.016	0.010	5651174	N/A
Dissolved Calcium (Ca)	ug/L	3100	3000	5651174	1300	2000	5651335	5200	100	5651174	N/A
Dissolved Chromium (Cr)	ug/L	2.5	<1.0	5651174	<1.0	<1.0	5651335	<1.0	1.0	5651174	N/A
Dissolved Cobalt (Co)	ug/L	0.73	1.4	5651174	2.3	1.4	5651335	1.9	0.40	5651174	N/A
Dissolved Copper (Cu)	ug/L	<2.0	<2.0	5651174	<2.0	2.1	5651335	<2.0	2.0	5651174	N/A
Dissolved Iron (Fe)	ug/L	880	210	5651174	110	140	5651335	1700	50	5651174	N/A
Dissolved Lead (Pb)	ug/L	1.4	1.0	5651174	<0.50	2.9	5651335	36	0.50	5651174	N/A
Dissolved Magnesium (Mg)	ug/L	890	740	5651174	190	530	5651335	1400	100	5651174	N/A
Dissolved Manganese (Mn)	ug/L	39	160	5651174	150	480	5651335	370	2.0	5651174	N/A
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	5651174	<2.0	5.8	5651335	<2.0	2.0	5651174	N/A
Dissolved Nickel (Ni)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	5651335	<2.0	2.0	5651174	N/A
Dissolved Phosphorus (P)	ug/L	<100	<100	5651174	<100	<100	5651335	<100	100	5651174	N/A
Dissolved Potassium (K)	ug/L	890	670	5651174	310	450	5651335	990	100	5651174	N/A
Dissolved Selenium (Se)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	5651335	<1.0	1.0	5651174	N/A
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	5651174	<0.10	<0.10	5651335	<0.10	0.10	5651174	N/A
Dissolved Sodium (Na)	ug/L	800	570	5651174	460	660	5651335	760	100	5651174	N/A
Dissolved Strontium (Sr)	ug/L	11	22	5651174	10	14	5651335	40	2.0	5651174	N/A
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	5651174	<0.10	<0.10	5651335	<0.10	0.10	5651174	N/A
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	5651335	<2.0	2.0	5651174	N/A
Dissolved Titanium (Ti)	ug/L	22	<2.0	5651174	<2.0	<2.0	5651335	<2.0	2.0	5651174	N/A
Dissolved Uranium (U)	ug/L	0.26	<0.10	5651174	<0.10	0.39	5651335	0.30	0.10	5651174	N/A
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	5651335	<2.0	2.0	5651174	N/A
Dissolved Zinc (Zn)	ug/L	11	5.9	5651174	23	<5.0	5651335	<5.0	5.0	5651174	N/A

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ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHQ415	HHQ416		HHQ417	HHQ418	HHQ419			
Sampling Date		2018/07/18	2018/07/18		2018/07/18	2018/07/18	2018/07/18			
COC Number		D 33409	D 33409		D 33409	D 33409	D 33409			
	UNITS	**2018-MW09**	**2018-MW11**	**QC Batch**	**2018-MW20**	**2018-MW26**	**2018-MW27**	**RDL**	**QC Batch**	**MDL**
Metals										
Dissolved Aluminum (Al)	ug/L	14	61	5651174	33	35	24	5.0	5651335	N/A
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Barium (Ba)	ug/L	32	20	5651174	130	38	43	1.0	5651335	N/A
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Boron (B)	ug/L	<50	<50	5651174	<50	<50	<50	50	5651335	N/A
Dissolved Cadmium (Cd)	ug/L	<0.010	<0.010	5651174	0.030	0.020	0.024	0.010	5651335	N/A
Dissolved Calcium (Ca)	ug/L	3000	4100	5651174	4300	2100	4000	100	5651335	N/A
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Cobalt (Co)	ug/L	<0.40	<0.40	5651174	2.5	1.5	1.8	0.40	5651335	N/A
Dissolved Copper (Cu)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Iron (Fe)	ug/L	<50	59	5651174	360	180	<50	50	5651335	N/A
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	5651174	74	<0.50	<0.50	0.50	5651335	N/A
Dissolved Magnesium (Mg)	ug/L	380	620	5651174	810	660	1100	100	5651335	N/A
Dissolved Manganese (Mn)	ug/L	16	43	5651174	250	190	280	2.0	5651335	N/A
Dissolved Molybdenum (Mo)	ug/L	2.2	<2.0	5651174	<2.0	<2.0	3.8	2.0	5651335	N/A
Dissolved Nickel (Ni)	ug/L	<2.0	<2.0	5651174	2.9	<2.0	<2.0	2.0	5651335	N/A
Dissolved Phosphorus (P)	ug/L	<100	<100	5651174	<100	<100	<100	100	5651335	N/A
Dissolved Potassium (K)	ug/L	800	1100	5651174	1100	1000	1500	100	5651335	N/A
Dissolved Selenium (Se)	ug/L	<1.0	<1.0	5651174	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	5651174	<0.10	<0.10	<0.10	0.10	5651335	N/A
Dissolved Sodium (Na)	ug/L	1900	1500	5651174	880	550	890	100	5651335	N/A
Dissolved Strontium (Sr)	ug/L	15	18	5651174	28	12	19	2.0	5651335	N/A
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	5651174	<0.10	<0.10	<0.10	0.10	5651335	N/A
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Titanium (Ti)	ug/L	<2.0	2.7	5651174	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Uranium (U)	ug/L	<0.10	<0.10	5651174	0.12	0.12	0.11	0.10	5651335	N/A
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	5651174	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	5651174	<5.0	<5.0	<5.0	5.0	5651335	N/A

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ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHQ420	HHQ421	HHQ422		HHQ423		HHQ424			
Sampling Date		2018/07/18	2018/07/18	2018/07/19		2018/07/19		2018/07/19			
COC Number		D 33409	D 33409	D 33409		D 33409		D 33409			
	UNITS	**2018-MW31**	**2018-MW32**	**2018-MW43**	**QC Batch**	**2018-MW41**	**QC Batch**	**2018-MW39**	**RDL**	**QC Batch**	**MDL**
Metals											
Dissolved Aluminum (Al)	ug/L	27	6.4	37	5651335	12	5651174	220	5.0	5654401	N/A
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	5651335	<1.0	5651174	<1.0	1.0	5654401	N/A
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	<1.0	5651335	<1.0	5651174	<1.0	1.0	5654401	N/A
Dissolved Barium (Ba)	ug/L	160	70	23	5651335	12	5651174	9.8	1.0	5654401	N/A
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	5651335	<1.0	5651174	<1.0	1.0	5654401	N/A
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Boron (B)	ug/L	<50	<50	<50	5651335	<50	5651174	<50	50	5654401	N/A
Dissolved Cadmium (Cd)	ug/L	0.052	0.021	0.010	5651335	<0.010	5651174	<0.010	0.010	5654401	N/A
Dissolved Calcium (Ca)	ug/L	9300	4400	2000	5651335	1600	5651174	250	100	5654401	N/A
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	5651335	<1.0	5651174	<1.0	1.0	5654401	N/A
Dissolved Cobalt (Co)	ug/L	4.8	2.2	2.4	5651335	<0.40	5651174	0.48	0.40	5654401	N/A
Dissolved Copper (Cu)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Iron (Fe)	ug/L	170	160	<50	5651335	<50	5651174	53	50	5654401	N/A
Dissolved Lead (Pb)	ug/L	<0.50	0.77	<0.50	5651335	<0.50	5651174	<0.50	0.50	5654401	N/A
Dissolved Magnesium (Mg)	ug/L	3100	1100	350	5651335	320	5651174	<100	100	5654401	N/A
Dissolved Manganese (Mn)	ug/L	1000	180	290	5651335	6.4	5651174	75	2.0	5654401	N/A
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Nickel (Ni)	ug/L	2.2	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	5651335	<100	5651174	<100	100	5654401	N/A
Dissolved Potassium (K)	ug/L	1900	810	670	5651335	550	5651174	110	100	5654401	N/A
Dissolved Selenium (Se)	ug/L	<1.0	<1.0	<1.0	5651335	<1.0	5651174	<1.0	1.0	5654401	N/A
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	5651335	<0.10	5651174	<0.10	0.10	5654401	N/A
Dissolved Sodium (Na)	ug/L	2200	920	910	5651335	650	5651174	280	100	5654401	N/A
Dissolved Strontium (Sr)	ug/L	55	22	11	5651335	6.4	5651174	2.8	2.0	5654401	N/A
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	5651335	<0.10	5651174	<0.10	0.10	5654401	N/A
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Uranium (U)	ug/L	0.26	<0.10	<0.10	5651335	<0.10	5651174	<0.10	0.10	5654401	N/A
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	<2.0	5651335	<2.0	5651174	<2.0	2.0	5654401	N/A
Dissolved Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	5651335	<5.0	5651174	<5.0	5.0	5654401	N/A

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		HHQ425	HHQ426	HHQ427	HHQ428	HHQ429	HHQ430			
Sampling Date		2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW37**	**2018-MW34**	**2018-MW33**	**2018-MW46**	**2018-MW47**	**2018-MW68**	**RDL**	**QC Batch**	**MDL**
Metals										
Dissolved Aluminum (Al)	ug/L	100	67	160	14	32	9.5	5.0	5651335	N/A
Dissolved Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Barium (Ba)	ug/L	15	15	14	57	17	31	1.0	5651335	N/A
Dissolved Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Boron (B)	ug/L	<50	<50	<50	<50	<50	<50	50	5651335	N/A
Dissolved Cadmium (Cd)	ug/L	0.021	0.017	0.041	<0.010	<0.010	<0.010	0.010	5651335	N/A
Dissolved Calcium (Ca)	ug/L	450	730	1300	2300	1300	1400	100	5651335	N/A
Dissolved Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Cobalt (Co)	ug/L	1.4	1.4	0.72	<0.40	<0.40	<0.40	0.40	5651335	N/A
Dissolved Copper (Cu)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Iron (Fe)	ug/L	<50	<50	330	<50	<50	<50	50	5651335	N/A
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5651335	N/A
Dissolved Magnesium (Mg)	ug/L	<100	180	<100	320	190	180	100	5651335	N/A
Dissolved Manganese (Mn)	ug/L	170	120	100	47	30	30	2.0	5651335	N/A
Dissolved Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Nickel (Ni)	ug/L	2.2	3.6	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Phosphorus (P)	ug/L	<100	<100	<100	<100	<100	<100	100	5651335	N/A
Dissolved Potassium (K)	ug/L	240	430	270	730	610	530	100	5651335	N/A
Dissolved Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5651335	N/A
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651335	N/A
Dissolved Sodium (Na)	ug/L	330	640	260	1300	700	680	100	5651335	N/A
Dissolved Strontium (Sr)	ug/L	3.1	5.9	7.8	14	8.6	9.1	2.0	5651335	N/A
Dissolved Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651335	N/A
Dissolved Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Titanium (Ti)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	2.0	5651335	N/A
Dissolved Uranium (U)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5651335	N/A
Dissolved Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5651335	N/A
Dissolved Zinc (Zn)	ug/L	5.1	<5.0	6.0	<5.0	<5.0	<5.0	5.0	5651335	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHQ410		HHQ411		HHQ412		HHQ413			
Sampling Date		2018/07/18		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409		D 33409			
	UNITS	**2018-MW01**	**RDL**	**2018-MW18**	**RDL**	**2018-MW50**	**RDL**	**2018-MW17**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	ug/L	<0.050	0.050	80 (1)	0.50	170 (1)	0.50	13	0.050	5647268	N/A
2-Methylnaphthalene	ug/L	<0.050	0.050	95 (1)	0.50	160 (1)	0.50	9.2	0.050	5647268	N/A
Acenaphthene	ug/L	<0.010	0.010	<2.5 (2)	2.5	<7.0 (2)	7.0	<2.5 (2)	2.5	5647268	N/A
Acenaphthylene	ug/L	<0.010	0.010	<2.0 (2)	2.0	<3.0 (2)	3.0	<1.4 (2)	1.4	5647268	N/A
Anthracene	ug/L	<0.010	0.010	<0.050 (2)	0.050	<0.30 (2)	0.30	<0.060 (2)	0.060	5647268	N/A
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.030 (2)	0.030	<0.020 (2)	0.020	5647268	N/A
Benzo(a)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b/j)fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	5646544	N/A
Benzo(g,h,i)perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(j)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(k)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Chrysene	ug/L	<0.010	0.010	0.017	0.010	<0.20 (2)	0.20	0.036	0.010	5647268	N/A
Dibenz(a,h)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Fluoranthene	ug/L	<0.010	0.010	<0.030 (2)	0.030	<0.060 (2)	0.060	<0.040 (2)	0.040	5647268	N/A
Fluorene	ug/L	<0.010	0.010	2.7	0.010	3.8	0.010	1.4	0.010	5647268	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Naphthalene	ug/L	<0.20	0.20	56 (1)	2.0	<9.0 (2)	9.0	<3.0 (2)	3.0	5647268	N/A
Perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Phenanthrene	ug/L	<0.010	0.010	<2.5 (2)	2.5	<9.0 (2)	9.0	<1.0 (2)	1.0	5647268	N/A
Pyrene	ug/L	<0.010	0.010	<0.030 (2)	0.030	0.17	0.010	0.059	0.010	5647268	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	82		97		83		90		5647268	
D14-Terphenyl	%	85		95		111		116		5647268	
D8-Acenaphthylene	%	94		102		69		60		5647268	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to sample dilution.
(2) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Stantec Consulting Ltd
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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHQ414		HHQ415		HHQ416		HHQ417			
Sampling Date		2018/07/18		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409		D 33409			
	UNITS	**2018-MW14**	**RDL**	**2018-MW09**	**RDL**	**2018-MW11**	**RDL**	**2018-MW20**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	ug/L	150 (1)	1.0	0.090	0.050	<0.050	0.050	150 (1)	1.0	5647268	N/A
2-Methylnaphthalene	ug/L	190 (1)	1.0	0.12	0.050	<0.050	0.050	210 (1)	1.0	5647268	N/A
Acenaphthene	ug/L	<3.0 (2)	3.0	<0.010	0.010	<0.010	0.010	<3.0 (2)	3.0	5647268	N/A
Acenaphthylene	ug/L	<2.0 (2)	2.0	<0.010	0.010	<0.020 (2)	0.020	<2.0 (2)	2.0	5647268	N/A
Anthracene	ug/L	<0.040 (2)	0.040	<0.010	0.010	<0.020 (2)	0.020	<0.080 (2)	0.080	5647268	N/A
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(a)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b/j)fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	5646544	N/A
Benzo(g,h,i)perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(j)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(k)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Chrysene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.030 (2)	0.030	5647268	N/A
Dibenz(a,h)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.040 (2)	0.040	5647268	N/A
Fluorene	ug/L	2.9	0.010	<0.020 (2)	0.020	<0.010	0.010	3.7	0.010	5647268	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Naphthalene	ug/L	110 (1)	4.0	<0.20	0.20	<0.20	0.20	130 (1)	4.0	5647268	N/A
Perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Phenanthrene	ug/L	<2.0 (2)	2.0	<0.010	0.010	<0.030 (2)	0.030	<3.0 (2)	3.0	5647268	N/A
Pyrene	ug/L	<0.020 (2)	0.020	<0.010	0.010	<0.010	0.010	<0.040 (2)	0.040	5647268	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	82		97		56		81		5647268	
D14-Terphenyl	%	95 (3)		104 (3)		93 (3)		104 (3)		5647268	
D8-Acenaphthylene	%	56		97		54		53		5647268	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to sample dilution.
(2) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(3) PAH sample contained sediment.

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHQ418			HHQ419		HHQ420		HHQ421			
Sampling Date		2018/07/18			2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409			D 33409		D 33409		D 33409			
	UNITS	**2018-MW26**	**RDL**	**QC Batch**	**2018-MW27**	**RDL**	**2018-MW31**	**RDL**	**2018-MW32**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons												
1-Methylnaphthalene	ug/L	1600 (1)	5.0	5659538	960 (1)	5.0	220 (1)	1.0	180 (1)	5.0	5647268	N/A
2-Methylnaphthalene	ug/L	1800 (1)	5.0	5659538	1700 (1)	5.0	360 (1)	1.0	300 (1)	5.0	5647268	N/A
Acenaphthene	ug/L	270 (2)	270	5659538	<16 (2)	16	<8.0 (2)	8.0	1.6	0.010	5647268	N/A
Acenaphthylene	ug/L	<71 (2)	71	5659538	<15 (2)	15	<4.0 (2)	4.0	<2.0 (2)	2.0	5647268	N/A
Anthracene	ug/L	2.2	0.20	5659538	<0.80 (2)	0.80	<0.40 (2)	0.40	2.6	0.010	5647268	N/A
Benzo(a)anthracene	ug/L	<0.40 (2)	0.40	5659538	<0.030 (2)	0.030	<0.050 (2)	0.050	<0.010	0.010	5647268	N/A
Benzo(a)pyrene	ug/L	<0.30 (2)	0.30	5659538	<0.020 (2)	0.020	<0.030 (2)	0.030	<0.010	0.010	5647268	N/A
Benzo(b)fluoranthene	ug/L	<0.30 (2)	0.30	5659538	<0.020 (2)	0.020	<0.030 (2)	0.030	<0.010	0.010	5647268	N/A
Benzo(b/j)fluoranthene	ug/L	<0.60	0.60	5646544	<0.030	0.030	<0.050	0.050	<0.020	0.020	5646544	N/A
Benzo(g,h,i)perylene	ug/L	<0.30 (2)	0.30	5659538	<0.010	0.010	<0.040 (2)	0.040	<0.010	0.010	5647268	N/A
Benzo(j)fluoranthene	ug/L	<0.30 (2)	0.30	5659538	<0.010	0.010	<0.020 (2)	0.020	<0.010	0.010	5647268	N/A
Benzo(k)fluoranthene	ug/L	<0.30 (2)	0.30	5659538	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Chrysene	ug/L	1.6	0.20	5659538	0.11	0.010	<0.090 (2)	0.090	<0.010	0.010	5647268	N/A
Dibenz(a,h)anthracene	ug/L	<0.30 (2)	0.30	5659538	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Fluoranthene	ug/L	2.8	0.20	5659538	0.19	0.010	0.12	0.010	<0.010	0.010	5647268	N/A
Fluorene	ug/L	190	0.20	5659538	57 (1)	1.0	3.5 (2)	0.010	5.0	0.010	5647268	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.30 (2)	0.30	5659538	<0.010	0.010	<0.020 (2)	0.020	<0.010	0.010	5647268	N/A
Naphthalene	ug/L	150 (1)	4.0	5659538	460 (1)	20	110 (1)	4.0	210 (1)	20	5647268	N/A
Perylene	ug/L	<0.30 (2)	0.30	5659538	<0.020 (2)	0.020	<0.020 (2)	0.020	<0.010	0.010	5647268	N/A
Phenanthrene	ug/L	170	0.20	5659538	25	0.010	<10 (2)	10	2.3	0.010	5647268	N/A
Pyrene	ug/L	3.6	0.20	5659538	0.26	0.010	0.26	0.010	<0.010	0.010	5647268	N/A
Surrogate Recovery (%)												
D10-Anthracene	%	96		5659538	85		92		79		5647268	
D14-Terphenyl	%	87 (1)		5659538	89		114		83		5647268	
D8-Acenaphthylene	%	531 (3)		5659538	91		56		104		5647268	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to sample dilution.
(2) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(3) PAH surrogate(s) not within acceptance limits due to sample dilution / product interference.

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHQ422		HHQ423		HHQ424		HHQ425			
Sampling Date		2018/07/19		2018/07/19		2018/07/19		2018/07/19			
COC Number		D 33409		D 33409		D 33409		D 33409			
	UNITS	**2018-MW43**	**RDL**	**2018-MW41**	**RDL**	**2018-MW39**	**RDL**	**2018-MW37**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	ug/L	0.14	0.050	<0.050	0.050	20	0.050	<0.050	0.050	5647268	N/A
2-Methylnaphthalene	ug/L	0.18	0.050	<0.050	0.050	29	0.050	<0.050	0.050	5647268	N/A
Acenaphthene	ug/L	<0.040 (1)	0.040	<0.010	0.010	<0.90 (1)	0.90	<0.020 (1)	0.020	5647268	N/A
Acenaphthylene	ug/L	<0.020 (1)	0.020	<0.010	0.010	<0.30 (1)	0.30	<0.010	0.010	5647268	N/A
Anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.030 (1)	0.030	<0.010	0.010	5647268	N/A
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(a)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(b/j)fluoranthene	ug/L	<0.020	0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	5646544	N/A
Benzo(g,h,i)perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(j)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Benzo(k)fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Chrysene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Dibenz(a,h)anthracene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Fluoranthene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Fluorene	ug/L	0.054	0.010	<0.010	0.010	1.6	0.010	<0.010	0.010	5647268	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Naphthalene	ug/L	<0.20	0.20	<0.20	0.20	15	0.20	<0.20	0.20	5647268	N/A
Perylene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Phenanthrene	ug/L	<0.050 (1)	0.050	<0.010	0.010	<0.50 (1)	0.50	<0.010	0.010	5647268	N/A
Pyrene	ug/L	<0.010	0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	5647268	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	88		93		82		87		5647268	
D14-Terphenyl	%	107 (2)		120		110 (2)		111 (2)		5647268	
D8-Acenaphthylene	%	97		91		80		89		5647268	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(2) PAH sample contained sediment.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		HHQ426		HHQ427		HHQ428	HHQ429	HHQ430			
Sampling Date		2018/07/19		2018/07/19		2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409		D 33409		D 33409	D 33409	D 33409			
	UNITS	**2018-MW34**	**RDL**	**2018-MW33**	**QC Batch**	**2018-MW46**	**2018-MW47**	**2018-MW68**	**RDL**	**QC Batch**	**MDL**
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	ug/L	<0.050	0.050	<0.050	5647268	<0.050	<0.050	<0.050	0.050	5654196	N/A
2-Methylnaphthalene	ug/L	<0.050	0.050	<0.050	5647268	<0.050	<0.050	<0.050	0.050	5654196	N/A
Acenaphthene	ug/L	<0.020 (1)	0.020	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Acenaphthylene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Anthracene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(a)anthracene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(a)pyrene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(b)fluoranthene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(b/j)fluoranthene	ug/L	<0.020	0.020	<0.020	5646544	<0.020	<0.020	<0.020	0.020	5646544	N/A
Benzo(g,h,i)perylene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(j)fluoranthene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Benzo(k)fluoranthene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Chrysene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Dibenz(a,h)anthracene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Fluoranthene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Fluorene	ug/L	0.016	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Naphthalene	ug/L	<0.20	0.20	<0.20	5647268	<0.20	<0.20	<0.20	0.20	5654196	N/A
Perylene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Phenanthrene	ug/L	<0.020 (1)	0.020	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Pyrene	ug/L	<0.010	0.010	<0.010	5647268	<0.010	<0.010	<0.010	0.010	5654196	N/A
Surrogate Recovery (%)											
D10-Anthracene	%	81		69	5647268	88	85	95		5654196	
D14-Terphenyl	%	99 (2)		108 (2)	5647268	83 (2)	87 (2)	84 (2)		5654196	
D8-Acenaphthylene	%	84		85	5647268	76	77	73		5654196	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(2) PAH sample contained sediment.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ410				HHQ410			
Sampling Date		2018/07/18				2018/07/18			
COC Number		D 33409				D 33409			
	UNITS	**2018-MW01**	**RDL**	**QC Batch**	**MDL**	**2018-MW01 Lab-Dup**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	0.0010	5651072	N/A	<0.0010	0.0010	5651072	N/A
Toluene	mg/L	<0.0010	0.0010	5651072	N/A	<0.0010	0.0010	5651072	N/A
Ethylbenzene	mg/L	<0.0010	0.0010	5651072	N/A	<0.0010	0.0010	5651072	N/A
Total Xylenes	mg/L	<0.0020	0.0020	5651072	N/A	<0.0020	0.0020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	<0.010	0.010	5651072	N/A	<0.010	0.010	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	<0.050	0.050	5653566	N/A				
>C16-C21 Hydrocarbons	mg/L	0.14	0.050	5653566	N/A				
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	5653566	N/A				
Modified TPH (Tier1)	mg/L	0.14	0.10	5646312	N/A				
Reached Baseline at C32	mg/L	Yes	N/A	5653566	N/A				
Hydrocarbon Resemblance	mg/L	COMMENT (1)	N/A	5653566	N/A				
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	96		5653566					
n-Dotriacontane - Extractable	%	89		5653566					
Isobutylbenzene - Volatile	%	96		5651072		99		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
(1) Unidentified compound(s) in fuel oil range.

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ411		HHQ412		HHQ413			
Sampling Date		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW18**	**RDL**	**2018-MW50**	**QC Batch**	**2018-MW17**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	0.0010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Toluene	mg/L	<0.0010	0.0010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Ethylbenzene	mg/L	<0.0010	0.0010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Total Xylenes	mg/L	0.029	0.0020	0.022	5651072	<0.0020	0.0020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	0.66 (1)	0.13	0.67 (2)	5651072	0.14 (3)	0.10	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	20	0.050	50	5653566	59	0.050	5653566	N/A
>C16-C21 Hydrocarbons	mg/L	3.0	0.050	7.9	5653566	5.7	0.050	5653566	N/A
>C21-<C32 Hydrocarbons	mg/L	0.41	0.10	0.87	5653566	0.59	0.10	5653566	N/A
Modified TPH (Tier1)	mg/L	24	0.13	59	5646312	65	0.10	5647176	N/A
Reached Baseline at C32	mg/L	Yes	N/A	Yes	5653566	Yes	N/A	5653566	N/A
Hydrocarbon Resemblance	mg/L	COMMENT (4)	N/A	COMMENT (4)	5653566	COMMENT (5)	N/A	5653566	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	100		110	5653566	111		5653566	
n-Dotriacontane - Extractable	%	88		96	5653566	94		5653566	
Isobutylbenzene - Volatile	%	83		79	5651072	87		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution. VPH analysis performed on previously opened vial.
(2) Elevated VPH RDL(s) due to sample dilution.
(3) Elevated VPH RDL(s) due to sample dilution / matrix interference.
(4) Fuel oil fraction.
(5) Weathered fuel oil fraction.

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ414		HHQ415	HHQ416		HHQ417			
Sampling Date		2018/07/18		2018/07/18	2018/07/18		2018/07/18			
COC Number		D 33409		D 33409	D 33409		D 33409			
	UNITS	**2018-MW14**	**RDL**	**2018-MW09**	**2018-MW11**	**RDL**	**2018-MW20**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/L	<0.010	0.010	<0.0010	<0.0010	0.0010	<0.010	0.010	5651072	N/A
Toluene	mg/L	<0.010	0.010	<0.0010	<0.0010	0.0010	0.060	0.010	5651072	N/A
Ethylbenzene	mg/L	<0.010	0.010	<0.0010	<0.0010	0.0010	0.040	0.010	5651072	N/A
Total Xylenes	mg/L	0.086	0.020	<0.0020	<0.0020	0.0020	1.4	0.020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	0.94	0.10	<0.010	<0.010	0.010	2.4	0.10	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	8.5	0.050	<0.050	0.065	0.050	38	0.050	5653566	N/A
>C16-C21 Hydrocarbons	mg/L	0.72	0.050	0.092	0.34	0.050	3.4	0.050	5653566	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	<0.10	<0.10	0.10	0.37	0.10	5653566	N/A
Modified TPH (Tier1)	mg/L	10	0.10	<0.10	0.41	0.10	44	0.10	5647176	N/A
Reached Baseline at C32	mg/L	Yes	N/A	NA	Yes	N/A	Yes	N/A	5653566	N/A
Hydrocarbon Resemblance	mg/L	COMMENT (1)	N/A	NA	COMMENT (2)	N/A	COMMENT (1)	N/A	5653566	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	97		92	90		101		5653566	
n-Dotriacontane - Extractable	%	84		87	84		89		5653566	
Isobutylbenzene - Volatile	%	97 (3)		98	98		94 (3)		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) Unidentified compound(s) in fuel oil range.
(3) Elevated VPH RDL(s) due to sample dilution.

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ418		HHQ419		HHQ420			
Sampling Date		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW26**	**RDL**	**2018-MW27**	**RDL**	**2018-MW31**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	0.0010	<0.010	0.010	<0.0010	0.0010	5651072	N/A
Toluene	mg/L	<0.0010	0.0010	<0.010	0.010	<0.0010	0.0010	5651072	N/A
Ethylbenzene	mg/L	0.0015	0.0010	<0.010	0.010	0.011	0.0010	5651072	N/A
Total Xylenes	mg/L	0.025	0.0020	0.13	0.020	0.19	0.0020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	0.84	0.010	1.6	0.10	1.3 (1)	0.10	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	88	0.50	170	0.50	58	0.25	5653566	N/A
>C16-C21 Hydrocarbons	mg/L	14	0.50	16	0.50	6.7	0.25	5653566	N/A
>C21-<C32 Hydrocarbons	mg/L	1.5	1.0	1.4	1.0	2.2	0.50	5653566	N/A
Modified TPH (Tier1)	mg/L	100	1.0	180	1.0	68	0.50	5647176	N/A
Reached Baseline at C32	mg/L	Yes	N/A	Yes	N/A	Yes	N/A	5653566	N/A
Hydrocarbon Resemblance	mg/L	COMMENT (2)	N/A	COMMENT (2)	N/A	COMMENT (3)	N/A	5653566	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	72		78		76		5653566	
n-Dotriacontane - Extractable	%	84 (4)		91 (4)		77 (4)		5653566	
Isobutylbenzene - Volatile	%	74		81 (5)		74		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) Fuel oil fraction.
(3) Fuel oil fraction. Possible lube oil fraction.
(4) Elevated TEH RDL(s) due to sample dilution.
(5) Elevated VPH RDL(s) due to sample dilution / matrix interference.

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ421		HHQ422		HHQ423			
Sampling Date		2018/07/18		2018/07/19		2018/07/19			
COC Number		D 33409		D 33409		D 33409			
	UNITS	**2018-MW32**	**RDL**	**2018-MW43**	**QC Batch**	**2018-MW41**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons									
Benzene	mg/L	<0.010	0.010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Toluene	mg/L	<0.010	0.010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Ethylbenzene	mg/L	<0.010	0.010	<0.0010	5651072	<0.0010	0.0010	5651072	N/A
Total Xylenes	mg/L	0.23	0.020	<0.0020	5651072	<0.0020	0.0020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	1.7	0.10	<0.010	5651072	<0.010	0.010	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	64	0.25	<0.050	5653566	<0.050	0.050	5653572	N/A
>C16-C21 Hydrocarbons	mg/L	4.7	0.25	<0.050	5653566	<0.050	0.050	5653572	N/A
>C21-<C32 Hydrocarbons	mg/L	0.54	0.50	<0.10	5653566	<0.10	0.10	5653572	N/A
Modified TPH (Tier1)	mg/L	71	0.50	<0.10	5647176	<0.10	0.10	5647176	N/A
Reached Baseline at C32	mg/L	Yes	N/A	NA	5653566	NA	N/A	5653572	N/A
Hydrocarbon Resemblance	mg/L	COMMENT (1)	N/A	NA	5653566	NA	N/A	5653572	N/A
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	71		92	5653566	86		5653572	
n-Dotriacontane - Extractable	%	81 (2)		88 (3)	5653566	79		5653572	
Isobutylbenzene - Volatile	%	94 (4)		95	5651072	94		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Fuel oil fraction.
(2) Elevated TEH RDL(s) due to sample dilution.
(3) TEH sample contained sediment.
(4) Elevated VPH RDL(s) due to sample dilution.

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ424		HHQ425	HHQ426	HHQ427	HHQ428			
Sampling Date		2018/07/19		2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409		D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW39**	**RDL**	**2018-MW37**	**2018-MW34**	**2018-MW33**	**2018-MW46**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons										
Benzene	mg/L	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	5651072	N/A
Toluene	mg/L	0.0072	0.0010	0.012	<0.0010	<0.0010	<0.0010	0.0010	5651072	N/A
Ethylbenzene	mg/L	0.0080	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	5651072	N/A
Total Xylenes	mg/L	0.044	0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	5651072	N/A
C6 - C10 (less BTEX)	mg/L	0.58 (1)	0.10	0.010	<0.010	<0.010	<0.010	0.010	5651072	N/A
>C10-C16 Hydrocarbons	mg/L	0.90	0.050	<0.050	<0.050	<0.050	<0.050	0.050	5653572	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	0.050	<0.050	<0.050	<0.050	<0.050	0.050	5653572	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	0.10	5653572	N/A
Modified TPH (Tier1)	mg/L	1.5	0.10	<0.10	<0.10	<0.10	<0.10	0.10	5647176	N/A
Reached Baseline at C32	mg/L	Yes	N/A	NA	NA	NA	NA	N/A	5653572	N/A
Hydrocarbon Resemblance	mg/L	COMMENT (2)	N/A	NA	NA	NA	NA	N/A	5653572	N/A
Surrogate Recovery (%)										
Isobutylbenzene - Extractable	%	86		89	83	79	85		5653572	
n-Dotriacontane - Extractable	%	80		84	78 (3)	77	80		5653572	
Isobutylbenzene - Volatile	%	97		98	96	97	98		5651072	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated VPH RDL(s) due to sample dilution.
(2) One product in the gas/fuel oil range.
(3) TEH sample contained sediment.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		HHQ429		HHQ430			
Sampling Date		2018/07/19		2018/07/19			
COC Number		D 33409		D 33409			
	UNITS	**2018-MW47**	**QC Batch**	**2018-MW68**	**RDL**	**QC Batch**	**MDL**
Petroleum Hydrocarbons							
Benzene	mg/L	<0.0010	5651072	<0.0010	0.0010	5651070	N/A
Toluene	mg/L	<0.0010	5651072	<0.0010	0.0010	5651070	N/A
Ethylbenzene	mg/L	<0.0010	5651072	<0.0010	0.0010	5651070	N/A
Total Xylenes	mg/L	<0.0020	5651072	<0.0020	0.0020	5651070	N/A
C6 - C10 (less BTEX)	mg/L	<0.010	5651072	<0.010	0.010	5651070	N/A
>C10-C16 Hydrocarbons	mg/L	<0.050	5653572	<0.050	0.050	5653572	N/A
>C16-C21 Hydrocarbons	mg/L	<0.050	5653572	<0.050	0.050	5653572	N/A
>C21-<C32 Hydrocarbons	mg/L	<0.10	5653572	<0.10	0.10	5653572	N/A
Modified TPH (Tier1)	mg/L	<0.10	5647176	<0.10	0.10	5647176	N/A
Reached Baseline at C32	mg/L	NA	5653572	NA	N/A	5653572	N/A
Hydrocarbon Resemblance	mg/L	NA	5653572	NA	N/A	5653572	N/A
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	86	5653572	91		5653572	
n-Dotriacontane - Extractable	%	82	5653572	86		5653572	
Isobutylbenzene - Volatile	%	96	5651072	90		5651070	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HHQ410	HHQ411	HHQ412	HHQ413	HHQ414	HHQ415			
Sampling Date		2018/07/18	2018/07/18	2018/07/18	2018/07/18	2018/07/18	2018/07/18			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW01**	**2018-MW18**	**2018-MW50**	**2018-MW17**	**2018-MW14**	**2018-MW09**	**RDL**	**QC Batch**	**MDL**
PCBs										
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.23	0.050	5651191	N/A
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.23	0.050	5646547	N/A
Surrogate Recovery (%)										
Decachlorobiphenyl	%	44	41	43	35	45	39		5651191	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		HHQ416		HHQ417		HHQ418		HHQ419			
Sampling Date		2018/07/18		2018/07/18		2018/07/18		2018/07/18			
COC Number		D 33409		D 33409		D 33409		D 33409			
	UNITS	**2018-MW11**	**QC Batch**	**2018-MW20**	**QC Batch**	**2018-MW26**	**RDL**	**2018-MW27**	**RDL**	**QC Batch**	**MDL**
PCBs											
Aroclor 1016	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1221	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1232	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1248	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1242	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1254	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Aroclor 1260	ug/L	<0.050	5651191	<0.050	5657555	<0.050	0.050	<0.70	0.70	5651191	N/A
Calculated Total PCB	ug/L	<0.050	5646547	<0.050	5646547	<0.050	0.050	<0.70	0.70	5646547	N/A
Surrogate Recovery (%)											
Decachlorobiphenyl	%	42	5651191	46 (1)	5657555	42		32 (2)		5651191	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) PCB sample contained sediment.
(2) Elevated PCB RDL due to matrix / co-extractive interference.

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POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HHQ420			HHQ421			HHQ422			
Sampling Date		2018/07/18			2018/07/18			2018/07/19			
COC Number		D 33409			D 33409			D 33409			
	UNITS	**2018-MW31**	**RDL**	**QC Batch**	**2018-MW32**	**RDL**	**QC Batch**	**2018-MW43**	**RDL**	**QC Batch**	**MDL**
PCBs											
Aroclor 1016	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1221	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1232	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1248	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1242	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1254	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Aroclor 1260	ug/L	<0.050	0.050	5657555	<0.76	0.76	5651191	<0.050	0.050	5657555	N/A
Calculated Total PCB	ug/L	<0.050	0.050	5646547	<0.76	0.76	5646547	<0.050	0.050	5646547	N/A
Surrogate Recovery (%)											
Decachlorobiphenyl	%	28 (1)		5657555	46 (2)		5651191	33 (3)		5657555	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) PCB surrogate not within acceptance limits. Analysis was repeated with similar results. PCB sample contained sediment.
(2) Elevated PCB RDL due to matrix / co-extractive interference.
(3) PCB sample contained sediment.

Maxxam ID		HHQ423	HHQ424	HHQ425	HHQ426	HHQ427			
Sampling Date		2018/07/19	2018/07/19	2018/07/19	2018/07/19	2018/07/19			
COC Number		D 33409	D 33409	D 33409	D 33409	D 33409			
	UNITS	**2018-MW41**	**2018-MW39**	**2018-MW37**	**2018-MW34**	**2018-MW33**	**RDL**	**QC Batch**	**MDL**
PCBs									
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5651191	N/A
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	5646547	N/A
Surrogate Recovery (%)									
Decachlorobiphenyl	%	36	49	31	40	61		5651191	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		HHQ428				HHQ428				HHQ429			
Sampling Date		2018/07/19				2018/07/19				2018/07/19			
COC Number		D 33409				D 33409				D 33409			
	UNITS	**2018-MW46**	**RDL**	**QC Batch**	**MDL**	**2018-MW46 Lab-Dup**	**RDL**	**QC Batch**	**MDL**	**2018-MW47**	**RDL**	**QC Batch**	**MDL**
PCBs													
Aroclor 1016	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1221	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1232	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1248	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1242	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1254	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Aroclor 1260	ug/L	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A	<0.050	0.050	5654259	N/A
Calculated Total PCB	ug/L	<0.050	0.050	5646547	N/A					<0.050	0.050	5646547	N/A
Surrogate Recovery (%)													
Decachlorobiphenyl	%	33		5654259		40		5654259		41		5654259	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		HHQ430			
Sampling Date		2018/07/19			
COC Number		D 33409			
	UNITS	**2018-MW68**	**RDL**	**QC Batch**	**MDL**
PCBs					
Aroclor 1016	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1221	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1232	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1248	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1242	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1254	ug/L	<0.050	0.050	5654259	N/A
Aroclor 1260	ug/L	<0.050	0.050	5654259	N/A
Calculated Total PCB	ug/L	<0.050	0.050	5646547	N/A
Surrogate Recovery (%)					
Decachlorobiphenyl	%	50		5654259	

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ398 **Collected:** 2018/07/17
Sample ID: 2018-MW49-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ399 **Collected:** 2018/07/17
Sample ID: 2018-MW49-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine

Maxxam ID: HHQ400 **Collected:** 2018/07/17
Sample ID: 2018-MW46-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ401 **Collected:** 2018/07/17
Sample ID: 2018-MW46-GP04 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine

Maxxam ID: HHQ402 **Collected:** 2018/07/17
Sample ID: 2018-MW47-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HHQ403 **Collected:** 2018/07/17
Sample ID: 2018-MW47-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5646543	N/A	2018/07/31	Automated Statchk
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5654222	2018/07/30	2018/07/31	Kelly Gale

Maxxam ID: HHQ404 **Collected:** 2018/07/17
Sample ID: 2018-MW47-GP06 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5646543	N/A	2018/07/31	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5654222	2018/07/30	2018/07/31	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ405 **Collected:** 2018/07/17
Sample ID: 2018-MW48-GP01 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
PCBs in soil by GC/ECD	GC/ECD	5652352	2018/07/27	2018/07/31	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/07/31	Automated Statchk
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ406 **Collected:** 2018/07/17
Sample ID: 2018-MW48-GP02 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine

Maxxam ID: HHQ407 **Collected:** 2018/07/17
Sample ID: 2018-MW48-GP06 **Shipped:**
Matrix: Soil **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

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TEST SUMMARY

Maxxam ID: HHQ408
Sample ID: 2018-SS49
Matrix: Soil

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Benzo(b/j)fluoranthene Sum (soil)	CALC	5646543	N/A	2018/07/31	Automated Statchk
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
PAH Compounds by GCMS (SIM)	GC/MS	5654222	2018/07/30	2018/07/31	Kelly Gale
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ409
Sample ID: 2018-SS50
Matrix: Soil

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
TEH in Soil (PIRI)	GC/FID	5654203	2018/07/30	2018/07/30	Michelle Shearer
Metals Solids Acid Extr. ICPMS	ICP/MS	5654319	2018/07/30	2018/07/31	Bryon Angevine
Moisture	BAL	5651288	N/A	2018/07/27	Shane Miller
ModTPH (T1) Calc. for Soil	CALC	5647027	N/A	2018/07/31	Automated Statchk
VPH in Soil (PIRI) - Field Preserved	PTGC/MS	5654231	N/A	2018/07/31	Shawn Helmkay

Maxxam ID: HHQ410
Sample ID: 2018-MW01
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ410 **Collected:** 2018/07/18
Sample ID: 2018-MW01 **Shipped:**
Matrix: Water **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5646312	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ410 Dup **Collected:** 2018/07/18
Sample ID: 2018-MW01 **Shipped:**
Matrix: Water **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia

Maxxam ID: HHQ411 **Collected:** 2018/07/18
Sample ID: 2018-MW18 **Shipped:**
Matrix: Water **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/03	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ411
Sample ID: 2018-MW18
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651964	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5646312	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ412
Sample ID: 2018-MW50
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/03	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5646312	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ412 Dup
Sample ID: 2018-MW50
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey

Maxxam ID: HHQ413
Sample ID: 2018-MW17
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/31	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/30	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651942	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ414
Sample ID: 2018-MW14
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/03	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5654206	N/A	2018/07/30	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ415
Sample ID: 2018-MW09
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5647147	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651597	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651613	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651622	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5647152	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ415
Sample ID: 2018-MW09
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Ion Balance (% Difference)	CALC	5647160	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5647163	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651624	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651633	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5647168	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651623	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5647170	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5647172	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651620	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651619	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5647174	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5654201	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ416
Sample ID: 2018-MW11
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5647147	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5647152	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery
Ion Balance (% Difference)	CALC	5647160	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5647163	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5647168	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ416
Sample ID: 2018-MW11
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5647170	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5647172	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5647174	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5654190	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ417
Sample ID: 2018-MW20
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/31	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/30	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/03	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5657555	2018/07/25	2018/08/02	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/02	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5654206	N/A	2018/07/30	Luke MacPherson

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ417
Sample ID: 2018-MW20
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ418
Sample ID: 2018-MW26
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/31	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5659538	2018/07/25	2018/08/07	Kelly Gale
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5654206	N/A	2018/07/30	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654190	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ419
Sample ID: 2018-MW27
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ419
Sample ID: 2018-MW27
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/31	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/31	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/30	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/07	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/08/01	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654190	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ420
Sample ID: 2018-MW31
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/31	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/31	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/30	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ420
Sample ID: 2018-MW31
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/04	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5657555	2018/07/25	2018/08/02	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/02	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651964	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ421
Sample ID: 2018-MW32
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/07	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/31	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/31	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/30	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/07	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/25	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ421
Sample ID: 2018-MW32
Matrix: Water

Collected: 2018/07/18
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5654206	N/A	2018/07/30	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654201	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ422
Sample ID: 2018-MW43
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653566	2018/07/28	2018/07/30	Michelle Shearer
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5657555	2018/07/26	2018/08/02	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/02	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651964	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/07/31	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ422
Sample ID: 2018-MW43
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ423
Sample ID: 2018-MW41
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5647147	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5647152	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5651174	N/A	2018/07/27	Cassandra Hartery
Ion Balance (% Difference)	CALC	5647160	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5647163	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5647168	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/26	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5647170	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5647172	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5647174	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651429	N/A	2018/07/27	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654190	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ423 Dup
Sample ID: 2018-MW41
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Organic carbon - Total (TOC)	TOCV/NDIR	5651429	N/A	2018/07/28	Luke MacPherson

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ424
Sample ID: 2018-MW39
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5647147	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5647152	N/A	2018/08/01	Automated Statchk
Metals Water Diss. MS (as rec'd)	CICP/MS	5654401	N/A	2018/07/31	Bryon Angevine
Ion Balance (% Difference)	CALC	5647160	N/A	2018/08/01	Automated Statchk
Anion and Cation Sum	CALC	5647163	N/A	2018/08/01	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5647168	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/26	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5647170	N/A	2018/08/01	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5647172	N/A	2018/08/01	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5647174	N/A	2018/08/01	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654201	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ425
Sample ID: 2018-MW37
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ425
Sample ID: 2018-MW37
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/26	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/30	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651942	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654201	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ426
Sample ID: 2018-MW34
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/26	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk

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Client Project #: 121414998
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TEST SUMMARY

Maxxam ID: HHQ426
Sample ID: 2018-MW34
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ427
Sample ID: 2018-MW33
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/01	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654873	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5647268	2018/07/25	2018/08/01	Lisa Gates
PCBs in water by GC/ECD	GC/ECD	5651191	2018/07/26	2018/07/31	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/07/31	Automated Statchk
pH	AT	5654871	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson

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Client Project #: 121414998
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Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ427
Sample ID: 2018-MW33
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654201	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ428
Sample ID: 2018-MW46
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/02	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5654196	2018/07/26	2018/08/01	Alan Stewart
PCBs in water by GC/ECD	GC/ECD	5654259	2018/07/30	2018/08/01	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/01	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651964	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5654190	N/A	2018/07/30	Nicholas Hutchinson

Maxxam ID: HHQ428 Dup
Sample ID: 2018-MW46
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PCBs in water by GC/ECD	GC/ECD	5654259	2018/07/30	2018/08/01	Chloe Bramble

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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ429
Sample ID: 2018-MW47
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/02	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5649292	N/A	2018/07/26	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5654196	2018/07/26	2018/08/01	Alan Stewart
PCBs in water by GC/ECD	GC/ECD	5654259	2018/07/30	2018/08/01	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/01	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651072	N/A	2018/07/27	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651964	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ430
Sample ID: 2018-MW68
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonate, Bicarbonate and Hydroxide	CALC	5646254	N/A	2018/07/31	Automated Statchk
Alkalinity	KONE	5651639	N/A	2018/07/30	Mary Clancey
Benzo(b/j)fluoranthene Sum (water)	CALC	5646544	N/A	2018/08/02	Automated Statchk
Chloride	KONE	5651644	N/A	2018/07/30	Nancy Rogers
Colour	KONE	5651651	N/A	2018/07/30	Mary Clancey
Conductance - water	AT	5654864	N/A	2018/07/30	Nicholas Hutchinson
TEH in Water (PIRI)	GC/FID	5653572	2018/07/28	2018/08/01	Marley Gidney
Hardness (calculated as CaCO3)		5646256	N/A	2018/07/30	Automated Statchk
Metals Water Diss. MS	CICP/MS	5651335	N/A	2018/07/27	Bryon Angevine

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Maxxam Job #: B8I7049
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Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ430
Sample ID: 2018-MW68
Matrix: Water

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Ion Balance (% Difference)	CALC	5646257	N/A	2018/07/31	Automated Statchk
Anion and Cation Sum	CALC	5646258	N/A	2018/07/31	Automated Statchk
Nitrogen Ammonia - water	KONE	5654308	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate + Nitrite	KONE	5651654	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrite	KONE	5651658	N/A	2018/07/30	Mary Clancey
Nitrogen - Nitrate (as N)	CALC	5646259	N/A	2018/07/30	Automated Statchk
PAH in Water by GC/MS (SIM)	GC/MS	5654196	2018/07/26	2018/08/01	Alan Stewart
PCBs in water by GC/ECD	GC/ECD	5654259	2018/07/30	2018/08/01	Chloe Bramble
PCB Aroclor sum (water)	CALC	5646547	N/A	2018/08/01	Automated Statchk
pH	AT	5654854	N/A	2018/07/30	Nicholas Hutchinson
Phosphorus - ortho	KONE	5651653	N/A	2018/07/30	Mary Clancey
VPH in Water (PIRI)	PTGC/MS	5651070	N/A	2018/07/28	Jackie Pia
Sat. pH and Langelier Index (@ 20C)	CALC	5646261	N/A	2018/07/31	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	5646262	N/A	2018/07/31	Automated Statchk
Reactive Silica	KONE	5651647	N/A	2018/07/30	Mary Clancey
Sulphate	KONE	5651645	N/A	2018/07/30	Mary Clancey
Total Dissolved Solids (TDS calc)	CALC	5646263	N/A	2018/07/31	Automated Statchk
Organic carbon - Total (TOC)	TOCV/NDIR	5651958	N/A	2018/07/28	Luke MacPherson
ModTPH (T1) Calc. for Water	CALC	5647176	N/A	2018/08/01	Automated Statchk
Turbidity	TURB	5656231	N/A	2018/07/31	Nicholas Hutchinson

Maxxam ID: HHQ431
Sample ID: 2019-VEG01
Matrix: Vegetation

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ432
Sample ID: 2019-VEG02
Matrix: Vegetation

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ433 **Collected:** 2018/07/19
Sample ID: 2019-VEG03 **Shipped:**
Matrix: Vegetation **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ434 **Collected:** 2018/07/19
Sample ID: 2019-VEG04 **Shipped:**
Matrix: Vegetation **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ435 **Collected:** 2018/07/19
Sample ID: 2019-VEG05 **Shipped:**
Matrix: Vegetation **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ436 **Collected:** 2018/07/19
Sample ID: 2019-VEG06 **Shipped:**
Matrix: Vegetation **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671323	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ437 **Collected:** 2018/07/19
Sample ID: 2019-VEG07 **Shipped:**
Matrix: Vegetation **Received:** 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671351	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

TEST SUMMARY

Maxxam ID: HHQ438
Sample ID: 2019-VEG08
Matrix: Vegetation

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury (CVAA)	CV/AA	5671351	2018/08/09	2018/08/10	Cody Cleary
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery
PCBs in soil by GC/ECD	GC/ECD	5676113	2018/08/02	2018/08/14	Chloe Bramble
PCB Aroclor sum (soil)	CALC	5647009	N/A	2018/08/14	Automated Statchk

Maxxam ID: HHQ438 Dup
Sample ID: 2019-VEG08
Matrix: Vegetation

Collected: 2018/07/19
Shipped:
Received: 2018/07/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Terrestrial Biota	FICP/MS	5662843	2018/08/03	2018/08/08	Cassandra Hartery

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

GENERAL COMMENTS

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

Package 1	9.2°C

Due to the nature of the samples (Vegetation), an alternate sample prep procedure was employed. Although accredited procedures were used (PCB-S) the accreditation does not extend to the matrix being prepared and analyzed.

Vegetation Samples: Data reported on an as received basis. No moisture correction applied.

Revised Report: Report re-issued due to IT related error. KN1 2018/08/23

Sample HHQ412 [2018-MW50] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ413 [2018-MW17] : RCAp Ion Balance acceptable. Low ionic strength sample.

Sample HHQ414 [2018-MW14] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ416 [2018-MW11] : Verified pH.

Poor RCAp Ion Balance due to sample matrix.

Sample HHQ417 [2018-MW20] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ418 [2018-MW26] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ423 [2018-MW41] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ424 [2018-MW39] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ425 [2018-MW37] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ426 [2018-MW34] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ427 [2018-MW33] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample HHQ429 [2018-MW47] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

QUALITY ASSURANCE REPORT

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5647268	D10-Anthracene	2018/07/27	87	50 - 130	95	50 - 130	106	%				
5647268	D14-Terphenyl	2018/07/27	89	50 - 130	96	50 - 130	108	%				
5647268	D8-Acenaphthylene	2018/07/27	85	50 - 130	94	50 - 130	96	%				
5651070	Isobutylbenzene - Volatile	2018/07/27	105	70 - 130	107	70 - 130	106	%				
5651072	Isobutylbenzene - Volatile	2018/07/27	83	70 - 130	98	70 - 130	96	%				
5651191	Decachlorobiphenyl	2018/07/31	78	30 - 130	97	30 - 130	83	%				
5652352	Decachlorobiphenyl	2018/07/31	92	70 - 130	95	70 - 130	88	%				
5653566	Isobutylbenzene - Extractable	2018/07/30	95	70 - 130	84	70 - 130	84	%				
5653566	n-Dotriacontane - Extractable	2018/07/30	102	70 - 130	88	70 - 130	80	%				
5653572	Isobutylbenzene - Extractable	2018/08/01	86	70 - 130	84	70 - 130	80	%				
5653572	n-Dotriacontane - Extractable	2018/08/01	88	70 - 130	88	70 - 130	83	%				
5654196	D10-Anthracene	2018/08/01	101	50 - 130	91	50 - 130	103	%				
5654196	D14-Terphenyl	2018/08/01	124	50 - 130	123	50 - 130	123	%				
5654196	D8-Acenaphthylene	2018/08/01	85	50 - 130	84	50 - 130	80	%				
5654203	Isobutylbenzene - Extractable	2018/07/30	94	60 - 130	89	60 - 130	89	%				
5654203	n-Dotriacontane - Extractable	2018/07/30	103	60 - 130	98	60 - 130	102	%				
5654222	D10-Anthracene	2018/07/31	107	50 - 130	108	50 - 130	90	%				
5654222	D14-Terphenyl (FS)	2018/07/31	96	50 - 130	102	50 - 130	95	%				
5654222	D8-Acenaphthylene	2018/07/31	103	50 - 130	104	50 - 130	104	%				
5654231	Isobutylbenzene - Volatile	2018/07/30	115 (4)	60 - 130	83	60 - 130	80	%				
5654259	Decachlorobiphenyl	2018/08/01	63	30 - 130	102	30 - 130	88	%				
5657555	Decachlorobiphenyl	2018/08/02	70	30 - 130	88	30 - 130	90	%				
5659538	D10-Anthracene	2018/08/05	74	50 - 130	74	50 - 130	71	%				
5659538	D14-Terphenyl	2018/08/05	89	50 - 130	91	50 - 130	76	%				
5659538	D8-Acenaphthylene	2018/08/05	82	50 - 130	82	50 - 130	80	%				
5676113	Decachlorobiphenyl	2018/08/14	93	70 - 130	95	70 - 130	92	%				
5647268	1-Methylnaphthalene	2018/07/27	85	50 - 130	90	50 - 130	<0.050	ug/L	NC	40		
5647268	2-Methylnaphthalene	2018/07/27	95	50 - 130	96	50 - 130	<0.050	ug/L	NC	40		
5647268	Acenaphthene	2018/07/27	92	50 - 130	91	50 - 130	<0.010	ug/L	NC	40		
5647268	Acenaphthylene	2018/07/27	89	50 - 130	93	50 - 130	<0.010	ug/L	NC	40		
5647268	Anthracene	2018/07/27	81	50 - 130	83	50 - 130	<0.010	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5647268	Benzo(a)anthracene	2018/07/27	84	50 - 130	90	50 - 130	<0.010	ug/L	NC	40		
5647268	Benzo(a)pyrene	2018/07/27	82	50 - 130	86	50 - 130	<0.010	ug/L	NC	40		
5647268	Benzo(b)fluoranthene	2018/07/27	104	50 - 130	105	50 - 130	<0.010	ug/L	NC	40		
5647268	Benzo(g,h,i)perylene	2018/07/27	78	50 - 130	85	50 - 130	<0.010	ug/L	NC	40		
5647268	Benzo(j)fluoranthene	2018/07/27	83	50 - 130	86	50 - 130	<0.010	ug/L	NC	40		
5647268	Benzo(k)fluoranthene	2018/07/27	86	50 - 130	95	50 - 130	<0.010	ug/L	NC	40		
5647268	Chrysene	2018/07/27	80	50 - 130	85	50 - 130	<0.010	ug/L	NC	40		
5647268	Dibenz(a,h)anthracene	2018/07/27	58	50 - 130	71	50 - 130	<0.010	ug/L	NC	40		
5647268	Fluoranthene	2018/07/27	82	50 - 130	89	50 - 130	<0.010	ug/L	NC	40		
5647268	Fluorene	2018/07/27	99	50 - 130	102	50 - 130	<0.010	ug/L	NC	40		
5647268	Indeno(1,2,3-cd)pyrene	2018/07/27	73	50 - 130	81	50 - 130	<0.010	ug/L	NC	40		
5647268	Naphthalene	2018/07/27	89	50 - 130	93	50 - 130	<0.20	ug/L	NC	40		
5647268	Perylene	2018/07/27	80	50 - 130	84	50 - 130	<0.010	ug/L	NC	40		
5647268	Phenanthrene	2018/07/27	71	50 - 130	79	50 - 130	<0.010	ug/L	NC	40		
5647268	Pyrene	2018/07/27	81	50 - 130	85	50 - 130	<0.010	ug/L	NC	40		
5649292	Nitrogen (Ammonia Nitrogen)	2018/07/26	97	80 - 120	106	80 - 120	<0.050	mg/L	NC	20		
5651070	Benzene	2018/07/27	116	70 - 130	106	70 - 130	<0.0010	mg/L	NC	40		
5651070	C6 - C10 (less BTEX)	2018/07/27					<0.010	mg/L	NC	40		
5651070	Ethylbenzene	2018/07/27	114	70 - 130	108	70 - 130	<0.0010	mg/L	NC	40		
5651070	Toluene	2018/07/27	114	70 - 130	106	70 - 130	<0.0010	mg/L	NC	40		
5651070	Total Xylenes	2018/07/27	115	70 - 130	107	70 - 130	<0.0020	mg/L	NC	40		
5651072	Benzene	2018/07/27	113	70 - 130	103	70 - 130	<0.0010	mg/L	NC	40		
5651072	C6 - C10 (less BTEX)	2018/07/27					<0.010	mg/L	NC	40		
5651072	Ethylbenzene	2018/07/27	111	70 - 130	104	70 - 130	<0.0010	mg/L	NC	40		
5651072	Toluene	2018/07/27	115	70 - 130	104	70 - 130	<0.0010	mg/L	NC	40		
5651072	Total Xylenes	2018/07/27	105	70 - 130	102	70 - 130	<0.0020	mg/L	NC	40		
5651174	Dissolved Aluminum (Al)	2018/07/27			100	80 - 120	<5.0	ug/L				
5651174	Dissolved Antimony (Sb)	2018/07/27	100	80 - 120	97	80 - 120	<1.0	ug/L				
5651174	Dissolved Arsenic (As)	2018/07/27	96	80 - 120	97	80 - 120	<1.0	ug/L				
5651174	Dissolved Barium (Ba)	2018/07/27	NC	80 - 120	98	80 - 120	<1.0	ug/L				
5651174	Dissolved Beryllium (Be)	2018/07/27	98	80 - 120	98	80 - 120	<1.0	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5651174	Dissolved Bismuth (Bi)	2018/07/27	103	80 - 120	102	80 - 120	<2.0	ug/L				
5651174	Dissolved Boron (B)	2018/07/27	99	80 - 120	96	80 - 120	<50	ug/L				
5651174	Dissolved Cadmium (Cd)	2018/07/27	101	80 - 120	98	80 - 120	<0.010	ug/L	7.1	20		
5651174	Dissolved Calcium (Ca)	2018/07/27	101	80 - 120	103	80 - 120	<100	ug/L	0.74	20		
5651174	Dissolved Chromium (Cr)	2018/07/27	94	80 - 120	95	80 - 120	<1.0	ug/L				
5651174	Dissolved Cobalt (Co)	2018/07/27	95	80 - 120	97	80 - 120	<0.40	ug/L				
5651174	Dissolved Copper (Cu)	2018/07/27	93	80 - 120	94	80 - 120	<2.0	ug/L	NC	20		
5651174	Dissolved Iron (Fe)	2018/07/27	131 (1)	80 - 120	103	80 - 120	<50	ug/L	3.6	20		
5651174	Dissolved Lead (Pb)	2018/07/27	99	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5651174	Dissolved Magnesium (Mg)	2018/07/27	98	80 - 120	100	80 - 120	<100	ug/L	0.16	20		
5651174	Dissolved Manganese (Mn)	2018/07/27	96	80 - 120	98	80 - 120	<2.0	ug/L	2.6	20		
5651174	Dissolved Molybdenum (Mo)	2018/07/27	105	80 - 120	96	80 - 120	<2.0	ug/L				
5651174	Dissolved Nickel (Ni)	2018/07/27	97	80 - 120	96	80 - 120	<2.0	ug/L				
5651174	Dissolved Phosphorus (P)	2018/07/27	105	80 - 120	105	80 - 120	<100	ug/L				
5651174	Dissolved Potassium (K)	2018/07/27	103	80 - 120	103	80 - 120	<100	ug/L	1.4	20		
5651174	Dissolved Selenium (Se)	2018/07/27	98	80 - 120	96	80 - 120	<1.0	ug/L				
5651174	Dissolved Silver (Ag)	2018/07/27	98	80 - 120	98	80 - 120	<0.10	ug/L				
5651174	Dissolved Sodium (Na)	2018/07/27	92	80 - 120	96	80 - 120	<100	ug/L	2.2	20		
5651174	Dissolved Strontium (Sr)	2018/07/27	97	80 - 120	101	80 - 120	<2.0	ug/L				
5651174	Dissolved Thallium (Tl)	2018/07/27	103	80 - 120	100	80 - 120	<0.10	ug/L				
5651174	Dissolved Tin (Sn)	2018/07/27	105	80 - 120	102	80 - 120	<2.0	ug/L				
5651174	Dissolved Titanium (Ti)	2018/07/27	113	80 - 120	100	80 - 120	<2.0	ug/L				
5651174	Dissolved Uranium (U)	2018/07/27	104	80 - 120	102	80 - 120	<0.10	ug/L				
5651174	Dissolved Vanadium (V)	2018/07/27	98	80 - 120	98	80 - 120	<2.0	ug/L				
5651174	Dissolved Zinc (Zn)	2018/07/27	101	80 - 120	99	80 - 120	<5.0	ug/L	NC	20		
5651191	Aroclor 1016	2018/07/31					<0.050	ug/L	NC	40		
5651191	Aroclor 1221	2018/07/31					<0.050	ug/L	NC	40		
5651191	Aroclor 1232	2018/07/31					<0.050	ug/L	NC	40		
5651191	Aroclor 1242	2018/07/31					<0.050	ug/L	NC	40		
5651191	Aroclor 1248	2018/07/31					<0.050	ug/L	NC	40		
5651191	Aroclor 1254	2018/07/31	89	70 - 130	93	70 - 130	<0.050	ug/L	NC	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5651191	Aroclor 1260	2018/07/31					<0.050	ug/L	NC	40		
5651288	Moisture	2018/07/27							1.1	25		
5651335	Dissolved Aluminum (Al)	2018/07/27	101	80 - 120	105	80 - 120	<5.0	ug/L	NC	20		
5651335	Dissolved Antimony (Sb)	2018/07/27	100	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Arsenic (As)	2018/07/27	98	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Barium (Ba)	2018/07/27	95	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Beryllium (Be)	2018/07/27	99	80 - 120	103	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Bismuth (Bi)	2018/07/27	101	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Boron (B)	2018/07/27	101	80 - 120	107	80 - 120	<50	ug/L	NC	20		
5651335	Dissolved Cadmium (Cd)	2018/07/27	99	80 - 120	103	80 - 120	<0.010	ug/L	NC	20		
5651335	Dissolved Calcium (Ca)	2018/07/27	101	80 - 120	105	80 - 120	<100	ug/L	NC	20		
5651335	Dissolved Chromium (Cr)	2018/07/27	98	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Cobalt (Co)	2018/07/27	100	80 - 120	102	80 - 120	<0.40	ug/L	NC	20		
5651335	Dissolved Copper (Cu)	2018/07/27	99	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Iron (Fe)	2018/07/27	102	80 - 120	105	80 - 120	<50	ug/L	NC	20		
5651335	Dissolved Lead (Pb)	2018/07/27	97	80 - 120	101	80 - 120	<0.50	ug/L	NC	20		
5651335	Dissolved Magnesium (Mg)	2018/07/27	104	80 - 120	105	80 - 120	<100	ug/L	NC	20		
5651335	Dissolved Manganese (Mn)	2018/07/27	99	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Molybdenum (Mo)	2018/07/27	104	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Nickel (Ni)	2018/07/27	99	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Phosphorus (P)	2018/07/27	103	80 - 120	107	80 - 120	<100	ug/L	NC	20		
5651335	Dissolved Potassium (K)	2018/07/27	102	80 - 120	105	80 - 120	<100	ug/L	NC	20		
5651335	Dissolved Selenium (Se)	2018/07/27	97	80 - 120	101	80 - 120	<1.0	ug/L	NC	20		
5651335	Dissolved Silver (Ag)	2018/07/27	97	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
5651335	Dissolved Sodium (Na)	2018/07/27	99	80 - 120	101	80 - 120	<100	ug/L	0.71	20		
5651335	Dissolved Strontium (Sr)	2018/07/27	100	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Thallium (Tl)	2018/07/27	102	80 - 120	104	80 - 120	<0.10	ug/L	NC	20		
5651335	Dissolved Tin (Sn)	2018/07/27	102	80 - 120	104	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Titanium (Ti)	2018/07/27	100	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5651335	Dissolved Uranium (U)	2018/07/27	102	80 - 120	106	80 - 120	<0.10	ug/L	NC	20		
5651335	Dissolved Vanadium (V)	2018/07/27	101	80 - 120	103	80 - 120	<2.0	ug/L	NC	20		

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5651335	Dissolved Zinc (Zn)	2018/07/27	103	80 - 120	106	80 - 120	<5.0	ug/L	NC	20		
5651429	Total Organic Carbon (C)	2018/07/28	99	85 - 115	98	80 - 120	<0.50	mg/L	0.89	15		
5651597	Total Alkalinity (Total as CaCO3)	2018/07/30	96	80 - 120	104	80 - 120	<5.0	mg/L	4.1	25		
5651613	Dissolved Chloride (Cl-)	2018/07/30	102	80 - 120	108	80 - 120	<1.0	mg/L	NC	25	107	80 - 120
5651619	Dissolved Sulphate (SO4)	2018/07/30	103	80 - 120	108	80 - 120	<2.0	mg/L	0.63	25		
5651620	Reactive Silica (SiO2)	2018/07/30	110	80 - 120	99	80 - 120	<0.50	mg/L	1.9	25		
5651622	Colour	2018/07/30			102	80 - 120	<5.0	TCU	13	20		
5651623	Orthophosphate (P)	2018/07/30	89	80 - 120	95	80 - 120	<0.010	mg/L	NC	25		
5651624	Nitrate + Nitrite (N)	2018/07/30	92	80 - 120	98	80 - 120	<0.050	mg/L	NC	25		
5651633	Nitrite (N)	2018/07/30	104	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
5651639	Total Alkalinity (Total as CaCO3)	2018/07/30	92	80 - 120	103	80 - 120	<5.0	mg/L	0.32	25		
5651644	Dissolved Chloride (Cl-)	2018/07/30	107	80 - 120	105	80 - 120	<1.0	mg/L	2.4	25	108	80 - 120
5651645	Dissolved Sulphate (SO4)	2018/07/30	115	80 - 120	105	80 - 120	<2.0	mg/L	2.4	25		
5651647	Reactive Silica (SiO2)	2018/07/30	107	80 - 120	100	80 - 120	<0.50	mg/L	1.2	25		
5651651	Colour	2018/07/30			103	80 - 120	<5.0	TCU	1.2	20		
5651653	Orthophosphate (P)	2018/07/30	91	80 - 120	95	80 - 120	<0.010	mg/L	NC	25		
5651654	Nitrate + Nitrite (N)	2018/07/30	94	80 - 120	93	80 - 120	<0.050	mg/L	1.8	25		
5651658	Nitrite (N)	2018/07/30	87	80 - 120	106	80 - 120	<0.010	mg/L	NC	20		
5651942	Total Organic Carbon (C)	2018/07/28	103	85 - 115	101	80 - 120	<0.50	mg/L	5.4	15		
5651958	Total Organic Carbon (C)	2018/07/28	104	85 - 115	102	80 - 120	<0.50	mg/L	NC	15		
5651964	Total Organic Carbon (C)	2018/07/28	NC	85 - 115	102	80 - 120	<0.50	mg/L	NC (2)	15		
5652352	Aroclor 1016	2018/07/31					<0.050	ug/g	NC	50		
5652352	Aroclor 1221	2018/07/31					<0.050	ug/g	NC	50		
5652352	Aroclor 1232	2018/07/31					<0.050	ug/g	NC	50		
5652352	Aroclor 1242	2018/07/31					<0.050	ug/g	NC	50		
5652352	Aroclor 1248	2018/07/31					<0.050	ug/g	NC	50		
5652352	Aroclor 1254	2018/07/31	114	70 - 130	111	70 - 130	<0.050	ug/g	NC	50		
5652352	Aroclor 1260	2018/07/31					<0.050	ug/g	NC	50		
5653566	>C10-C16 Hydrocarbons	2018/07/30	NC	70 - 130	89	70 - 130	<0.050	mg/L	7.7	40		
5653566	>C16-C21 Hydrocarbons	2018/07/30	97	70 - 130	83	70 - 130	<0.050	mg/L	25	40		
5653566	>C21-<C32 Hydrocarbons	2018/07/30	114	70 - 130	102	70 - 130	<0.10	mg/L	15	40		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5653572	>C10-C16 Hydrocarbons	2018/08/01	87	70 - 130	92	70 - 130	<0.050	mg/L	4.7	40		
5653572	>C16-C21 Hydrocarbons	2018/08/01	82	70 - 130	89	70 - 130	<0.050	mg/L	4.4	40		
5653572	>C21-<C32 Hydrocarbons	2018/08/01	101	70 - 130	107	70 - 130	<0.10	mg/L	7.2	40		
5654190	Turbidity	2018/07/30			100	80 - 120	<0.10	NTU	3.1	20	99	80 - 120
5654196	1-Methylnaphthalene	2018/08/01	88	50 - 130	91	50 - 130	<0.050	ug/L	NC	40		
5654196	2-Methylnaphthalene	2018/08/01	89	50 - 130	89	50 - 130	<0.050	ug/L	NC	40		
5654196	Acenaphthene	2018/08/01	91	50 - 130	95	50 - 130	<0.010	ug/L	NC	40		
5654196	Acenaphthylene	2018/08/01	87	50 - 130	91	50 - 130	<0.010	ug/L	NC	40		
5654196	Anthracene	2018/08/01	77	50 - 130	82	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(a)anthracene	2018/08/01	87	50 - 130	93	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(a)pyrene	2018/08/01	101	50 - 130	90	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(b)fluoranthene	2018/08/01	113	50 - 130	113	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(g,h,i)perylene	2018/08/01	102	50 - 130	87	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(j)fluoranthene	2018/08/01	112	50 - 130	93	50 - 130	<0.010	ug/L	NC	40		
5654196	Benzo(k)fluoranthene	2018/08/01	121	50 - 130	104	50 - 130	<0.010	ug/L	NC	40		
5654196	Chrysene	2018/08/01	91	50 - 130	97	50 - 130	<0.010	ug/L	NC	40		
5654196	Dibenz(a,h)anthracene	2018/08/01	77	50 - 130	68	50 - 130	<0.010	ug/L	NC	40		
5654196	Fluoranthene	2018/08/01	97	50 - 130	102	50 - 130	<0.010	ug/L	NC	40		
5654196	Fluorene	2018/08/01	114	50 - 130	97	50 - 130	<0.010	ug/L	NC	40		
5654196	Indeno(1,2,3-cd)pyrene	2018/08/01	71	50 - 130	75	50 - 130	<0.010	ug/L	NC	40		
5654196	Naphthalene	2018/08/01	89	50 - 130	89	50 - 130	<0.20	ug/L	NC	40		
5654196	Perylene	2018/08/01	73	50 - 130	83	50 - 130	<0.010	ug/L	NC	40		
5654196	Phenanthrene	2018/08/01	78	50 - 130	84	50 - 130	<0.010	ug/L	NC	40		
5654196	Pyrene	2018/08/01	89	50 - 130	107	50 - 130	<0.010	ug/L	NC	40		
5654201	Turbidity	2018/07/30			100	80 - 120	<0.10	NTU	8.5	20	99	80 - 120
5654203	>C10-C16 Hydrocarbons	2018/07/30	104	30 - 130	96	60 - 130	<10	mg/kg	NC	50		
5654203	>C16-C21 Hydrocarbons	2018/07/30	90	30 - 130	83	60 - 130	<10	mg/kg	NC	50		
5654203	>C21-<C32 Hydrocarbons	2018/07/30	100	30 - 130	96	60 - 130	<15	mg/kg	NC	50		
5654206	Total Organic Carbon (C)	2018/07/30	98	85 - 115	95	80 - 120	<0.50	mg/L	12	15		
5654222	1-Methylnaphthalene	2018/07/31	97	50 - 130	98	50 - 130	<0.010	mg/kg	14	50		
5654222	2-Methylnaphthalene	2018/07/31	102	50 - 130	111	50 - 130	<0.010	mg/kg	21	50		

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

QUALITY ASSURANCE REPORT(CONT'D)

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5654222	Acenaphthene	2018/07/31	84	50 - 130	104	50 - 130	<0.010	mg/kg	1.2	50		
5654222	Acenaphthylene	2018/07/31	107	50 - 130	108	50 - 130	<0.010	mg/kg	47	50		
5654222	Anthracene	2018/07/31	NC	50 - 130	97	50 - 130	<0.010	mg/kg	6.5	50		
5654222	Benzo(a)anthracene	2018/07/31	NC	50 - 130	90	50 - 130	<0.010	mg/kg	5.4	50		
5654222	Benzo(a)pyrene	2018/07/31	NC	50 - 130	107	50 - 130	<0.010	mg/kg	1.4	50		
5654222	Benzo(b)fluoranthene	2018/07/31	NC	50 - 130	119	50 - 130	<0.010	mg/kg	0.73	50		
5654222	Benzo(g,h,i)perylene	2018/07/31	NC	50 - 130	110	50 - 130	<0.010	mg/kg	1.6	50		
5654222	Benzo(j)fluoranthene	2018/07/31	NC	50 - 130	105	50 - 130	<0.010	mg/kg	3.5	50		
5654222	Benzo(k)fluoranthene	2018/07/31	NC	50 - 130	109	50 - 130	<0.010	mg/kg	2.5	50		
5654222	Chrysene	2018/07/31	NC	50 - 130	89	50 - 130	<0.010	mg/kg	8.7	50		
5654222	Dibenz(a,h)anthracene	2018/07/31	83	50 - 130	104	50 - 130	<0.010	mg/kg	7.9	50		
5654222	Fluoranthene	2018/07/31	NC	50 - 130	94	50 - 130	<0.010	mg/kg	3.7	50		
5654222	Fluorene	2018/07/31	91	50 - 130	111	50 - 130	<0.010	mg/kg	3.3	50		
5654222	Indeno(1,2,3-cd)pyrene	2018/07/31	NC	50 - 130	98	50 - 130	<0.010	mg/kg	3.5	50		
5654222	Naphthalene	2018/07/31	102	50 - 130	117	50 - 130	<0.010	mg/kg	65 (3)	50		
5654222	Perylene	2018/07/31	93	50 - 130	105	50 - 130	<0.010	mg/kg	0.93	50		
5654222	Phenanthrene	2018/07/31	NC	50 - 130	101	50 - 130	<0.010	mg/kg	12	50		
5654222	Pyrene	2018/07/31	NC	50 - 130	92	50 - 130	<0.010	mg/kg	3.4	50		
5654231	Benzene	2018/07/30	98	60 - 130	89	60 - 140	<0.025	mg/kg	NC	50		
5654231	C6 - C10 (less BTEX)	2018/07/30					<2.5	mg/kg	15	50		
5654231	Ethylbenzene	2018/07/30	102	60 - 130	88	60 - 140	<0.025	mg/kg	NC	50		
5654231	Toluene	2018/07/30	90	60 - 130	86	60 - 140	<0.025	mg/kg	14	50		
5654231	Total Xylenes	2018/07/30	99	60 - 130	86	60 - 140	<0.050	mg/kg	NC	50		
5654259	Aroclor 1016	2018/08/01					<0.050	ug/L	NC	40		
5654259	Aroclor 1221	2018/08/01					<0.050	ug/L	NC	40		
5654259	Aroclor 1232	2018/08/01					<0.050	ug/L	NC	40		
5654259	Aroclor 1242	2018/08/01					<0.050	ug/L	NC	40		
5654259	Aroclor 1248	2018/08/01					<0.050	ug/L	NC	40		
5654259	Aroclor 1254	2018/08/01	89	70 - 130	121	70 - 130	<0.050	ug/L	NC	40		
5654259	Aroclor 1260	2018/08/01					<0.050	ug/L	NC	40		
5654308	Nitrogen (Ammonia Nitrogen)	2018/07/30	88	80 - 120	93	80 - 120	<0.050	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5654319	Acid Extractable Aluminum (Al)	2018/07/31					<10	mg/kg				
5654319	Acid Extractable Antimony (Sb)	2018/07/31	103	75 - 125	104	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Arsenic (As)	2018/07/31	102	75 - 125	101	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Barium (Ba)	2018/07/31	108	75 - 125	98	75 - 125	<5.0	mg/kg				
5654319	Acid Extractable Beryllium (Be)	2018/07/31	111	75 - 125	106	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Bismuth (Bi)	2018/07/31	106	75 - 125	101	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Boron (B)	2018/07/31	112	75 - 125	112	75 - 125	<50	mg/kg				
5654319	Acid Extractable Cadmium (Cd)	2018/07/31	107	75 - 125	105	75 - 125	<0.30	mg/kg				
5654319	Acid Extractable Chromium (Cr)	2018/07/31	100	75 - 125	99	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Cobalt (Co)	2018/07/31	103	75 - 125	100	75 - 125	<1.0	mg/kg				
5654319	Acid Extractable Copper (Cu)	2018/07/31	102	75 - 125	99	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Iron (Fe)	2018/07/31					<50	mg/kg				
5654319	Acid Extractable Lead (Pb)	2018/07/31	102	75 - 125	98	75 - 125	<0.50	mg/kg	8.3	35		
5654319	Acid Extractable Lithium (Li)	2018/07/31	111	75 - 125	106	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Manganese (Mn)	2018/07/31	NC	75 - 125	99	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Mercury (Hg)	2018/07/31	99	75 - 125	105	75 - 125	<0.10	mg/kg				
5654319	Acid Extractable Molybdenum (Mo)	2018/07/31	105	75 - 125	104	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Nickel (Ni)	2018/07/31	104	75 - 125	101	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Rubidium (Rb)	2018/07/31	103	75 - 125	100	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Selenium (Se)	2018/07/31	107	75 - 125	106	75 - 125	<1.0	mg/kg				
5654319	Acid Extractable Silver (Ag)	2018/07/31	104	75 - 125	104	75 - 125	<0.50	mg/kg				
5654319	Acid Extractable Strontium (Sr)	2018/07/31	104	75 - 125	99	75 - 125	<5.0	mg/kg				
5654319	Acid Extractable Thallium (Tl)	2018/07/31	105	75 - 125	101	75 - 125	<0.10	mg/kg				
5654319	Acid Extractable Tin (Sn)	2018/07/31	107	75 - 125	104	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Uranium (U)	2018/07/31	102	75 - 125	98	75 - 125	<0.10	mg/kg				
5654319	Acid Extractable Vanadium (V)	2018/07/31	101	75 - 125	99	75 - 125	<2.0	mg/kg				
5654319	Acid Extractable Zinc (Zn)	2018/07/31	102	75 - 125	101	75 - 125	<5.0	mg/kg				
5654401	Dissolved Aluminum (Al)	2018/07/31	101	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
5654401	Dissolved Antimony (Sb)	2018/07/31	99	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
5654401	Dissolved Arsenic (As)	2018/07/31	99	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
5654401	Dissolved Barium (Ba)	2018/07/31	96	80 - 120	96	80 - 120	<1.0	ug/L	1.3	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5654401	Dissolved Beryllium (Be)	2018/07/31	102	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
5654401	Dissolved Bismuth (Bi)	2018/07/31	101	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
5654401	Dissolved Boron (B)	2018/07/31	102	80 - 120	101	80 - 120	<50	ug/L	1.0	20		
5654401	Dissolved Cadmium (Cd)	2018/07/31	101	80 - 120	100	80 - 120	<0.010	ug/L	NC	20		
5654401	Dissolved Calcium (Ca)	2018/07/31	NC	80 - 120	103	80 - 120	<100	ug/L	1.2	20		
5654401	Dissolved Chromium (Cr)	2018/07/31	96	80 - 120	96	80 - 120	<1.0	ug/L	NC	20		
5654401	Dissolved Cobalt (Co)	2018/07/31	95	80 - 120	98	80 - 120	<0.40	ug/L	NC	20		
5654401	Dissolved Copper (Cu)	2018/07/31	95	80 - 120	98	80 - 120	<2.0	ug/L	5.6	20		
5654401	Dissolved Iron (Fe)	2018/07/31	100	80 - 120	102	80 - 120	<50	ug/L	NC	20		
5654401	Dissolved Lead (Pb)	2018/07/31	96	80 - 120	98	80 - 120	<0.50	ug/L	NC	20		
5654401	Dissolved Magnesium (Mg)	2018/07/31	NC	80 - 120	102	80 - 120	<100	ug/L	0.56	20		
5654401	Dissolved Manganese (Mn)	2018/07/31	97	80 - 120	101	80 - 120	<2.0	ug/L	4.8	20		
5654401	Dissolved Molybdenum (Mo)	2018/07/31	104	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
5654401	Dissolved Nickel (Ni)	2018/07/31	93	80 - 120	100	80 - 120	<2.0	ug/L				
5654401	Dissolved Phosphorus (P)	2018/07/31	105	80 - 120	106	80 - 120	<100	ug/L	NC	20		
5654401	Dissolved Potassium (K)	2018/07/31	102	80 - 120	101	80 - 120	<100	ug/L	3.1	20		
5654401	Dissolved Selenium (Se)	2018/07/31	99	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
5654401	Dissolved Silver (Ag)	2018/07/31	99	80 - 120	99	80 - 120	<0.10	ug/L	NC	20		
5654401	Dissolved Sodium (Na)	2018/07/31	96	80 - 120	99	80 - 120	<100	ug/L	0.12	20		
5654401	Dissolved Strontium (Sr)	2018/07/31	99	80 - 120	101	80 - 120	<2.0	ug/L	2.1	20		
5654401	Dissolved Thallium (Tl)	2018/07/31	102	80 - 120	103	80 - 120	<0.10	ug/L	NC	20		
5654401	Dissolved Tin (Sn)	2018/07/31	105	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
5654401	Dissolved Titanium (Ti)	2018/07/31	97	80 - 120	97	80 - 120	<2.0	ug/L	NC	20		
5654401	Dissolved Uranium (U)	2018/07/31	104	80 - 120	106	80 - 120	<0.10	ug/L	2.5	20		
5654401	Dissolved Vanadium (V)	2018/07/31	100	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
5654401	Dissolved Zinc (Zn)	2018/07/31	96	80 - 120	101	80 - 120	<5.0	ug/L	NC	20		
5654854	pH	2018/07/30							1.2	N/A	100	97 - 103
5654864	Conductivity	2018/07/30			106	80 - 120	1.7, RDL=1.0	uS/cm	1.4	25		
5654871	pH	2018/07/30							1.6	N/A	101	97 - 103
5654873	Conductivity	2018/07/30			106	80 - 120	1.9, RDL=1.0	uS/cm	0.25	25		
5656231	Turbidity	2018/07/31			98	80 - 120	<0.10	NTU	NC	20	101	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5657555	Aroclor 1016	2018/08/02					<0.050	ug/L	NC	40		
5657555	Aroclor 1221	2018/08/02					<0.050	ug/L	NC	40		
5657555	Aroclor 1232	2018/08/02					<0.050	ug/L	NC	40		
5657555	Aroclor 1242	2018/08/02					<0.050	ug/L	NC	40		
5657555	Aroclor 1248	2018/08/02					<0.050	ug/L	NC	40		
5657555	Aroclor 1254	2018/08/02	90	70 - 130	90	70 - 130	<0.050	ug/L	NC	40		
5657555	Aroclor 1260	2018/08/02					<0.050	ug/L	NC	40		
5659538	1-Methylnaphthalene	2018/08/05	98	50 - 130	98	50 - 130	<0.050	ug/L				
5659538	2-Methylnaphthalene	2018/08/05	103	50 - 130	103	50 - 130	<0.050	ug/L				
5659538	Acenaphthene	2018/08/05	102	50 - 130	100	50 - 130	<0.010	ug/L				
5659538	Acenaphthylene	2018/08/05	103	50 - 130	103	50 - 130	<0.010	ug/L				
5659538	Anthracene	2018/08/05	95	50 - 130	96	50 - 130	<0.010	ug/L				
5659538	Benzo(a)anthracene	2018/08/05	99	50 - 130	110	50 - 130	<0.010	ug/L				
5659538	Benzo(a)pyrene	2018/08/05	121	50 - 130	111	50 - 130	<0.010	ug/L				
5659538	Benzo(b)fluoranthene	2018/08/05	123	50 - 130	117	50 - 130	<0.010	ug/L				
5659538	Benzo(g,h,i)perylene	2018/08/05	143 (5)	50 - 130	121	50 - 130	<0.010	ug/L				
5659538	Benzo(j)fluoranthene	2018/08/05	126	50 - 130	109	50 - 130	<0.010	ug/L				
5659538	Benzo(k)fluoranthene	2018/08/05	120	50 - 130	115	50 - 130	<0.010	ug/L				
5659538	Chrysene	2018/08/05	97	50 - 130	109	50 - 130	<0.010	ug/L				
5659538	Dibenz(a,h)anthracene	2018/08/05	104	50 - 130	82	50 - 130	<0.010	ug/L				
5659538	Fluoranthene	2018/08/05	99	50 - 130	119	50 - 130	<0.010	ug/L				
5659538	Fluorene	2018/08/05	109	50 - 130	120	50 - 130	<0.010	ug/L				
5659538	Indeno(1,2,3-cd)pyrene	2018/08/05	102	50 - 130	92	50 - 130	<0.010	ug/L				
5659538	Naphthalene	2018/08/05	108	50 - 130	102	50 - 130	<0.20	ug/L				
5659538	Perylene	2018/08/05	107	50 - 130	102	50 - 130	<0.010	ug/L				
5659538	Phenanthrene	2018/08/05	103	50 - 130	105	50 - 130	<0.010	ug/L				
5659538	Pyrene	2018/08/05	110	50 - 130	113	50 - 130	<0.010	ug/L				
5662843	Acid Extractable Aluminum (Al)	2018/08/08					<10	mg/kg	1.7	35		
5662843	Acid Extractable Antimony (Sb)	2018/08/08	101	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Arsenic (As)	2018/08/08	105	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Barium (Ba)	2018/08/08	105	75 - 125	98	75 - 125	<5.0	mg/kg	0.56	35		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5662843	Acid Extractable Beryllium (Be)	2018/08/08	105	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Boron (B)	2018/08/08	105	75 - 125	100	75 - 125	<5.0	mg/kg	1.5	35		
5662843	Acid Extractable Cadmium (Cd)	2018/08/08	106	75 - 125	100	75 - 125	<0.30	mg/kg	NC	35		
5662843	Acid Extractable Chromium (Cr)	2018/08/08	107	75 - 125	100	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Cobalt (Co)	2018/08/08	108	75 - 125	101	75 - 125	<1.0	mg/kg	NC	35		
5662843	Acid Extractable Copper (Cu)	2018/08/08	107	75 - 125	100	75 - 125	<2.0	mg/kg	0.087	35		
5662843	Acid Extractable Iron (Fe)	2018/08/08					<50	mg/kg	7.8	35		
5662843	Acid Extractable Lead (Pb)	2018/08/08	107	75 - 125	100	75 - 125	<0.50	mg/kg	31	35		
5662843	Acid Extractable Lithium (Li)	2018/08/08	112	75 - 125	105	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Manganese (Mn)	2018/08/08	NC	75 - 125	100	75 - 125	<2.0	mg/kg	0.27	35		
5662843	Acid Extractable Molybdenum (Mo)	2018/08/08	111	75 - 125	97	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Nickel (Ni)	2018/08/08	109	75 - 125	103	75 - 125	<2.0	mg/kg	2.7	35		
5662843	Acid Extractable Selenium (Se)	2018/08/08	101	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Silver (Ag)	2018/08/08	110	75 - 125	101	75 - 125	<0.50	mg/kg	NC	35		
5662843	Acid Extractable Strontium (Sr)	2018/08/08	111	75 - 125	99	75 - 125	<5.0	mg/kg	5.2	35		
5662843	Acid Extractable Thallium (Tl)	2018/08/08	104	75 - 125	101	75 - 125	<0.10	mg/kg	NC	35		
5662843	Acid Extractable Uranium (U)	2018/08/08	107	75 - 125	100	75 - 125	<0.10	mg/kg	NC	35		
5662843	Acid Extractable Vanadium (V)	2018/08/08	109	75 - 125	103	75 - 125	<2.0	mg/kg	NC	35		
5662843	Acid Extractable Zinc (Zn)	2018/08/08	NC	75 - 125	98	75 - 125	<5.0	mg/kg	0.19	35		
5671323	Mercury (Hg)	2018/08/10	96	75 - 125	106	80 - 120	<0.010	mg/kg	NC (6)	30	70	50 - 150
5671351	Mercury (Hg)	2018/08/10	102	75 - 125	99	80 - 120	<0.010	mg/kg	NC	30	75	50 - 150
5676113	Aroclor 1016	2018/08/14					<0.050	ug/g	NC	50		
5676113	Aroclor 1221	2018/08/14					<0.050	ug/g	NC	50		
5676113	Aroclor 1232	2018/08/14					<0.050	ug/g	NC	50		
5676113	Aroclor 1242	2018/08/14					<0.050	ug/g	NC	50		
5676113	Aroclor 1248	2018/08/14					<0.050	ug/g	NC	50		
5676113	Aroclor 1254	2018/08/14	106	70 - 130	108	70 - 130	<0.050	ug/g	NC	50		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
5676113	Aroclor 1260	2018/08/14					<0.050	ug/g	NC	50		

N/A = Not Applicable

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

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

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery is within QC acceptance limits. < 10 % of compounds in multi-component analysis in violation.

(2) Elevated reporting limit due to turbidity.

(3) Duplicate: results are outside acceptance limit. Analysis was repeated with similar results.

(4) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.

(5) Matrix Spike: results are outside acceptance limit. Insufficient sample for repeat analysis.

(6) Elevated RDL due to sample matrix.

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Maxxam Job #: B8I7049
Report Date: 2018/08/24

Stantec Consulting Ltd
Client Project #: 121414998
Site Location: BORDER BEACON
Sampler Initials: AP

VALIDATION SIGNATURE PAGE

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

Eric Dearman, Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

Rosemarie MacDonald, Scientific Specialist (Organics)

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

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CHAIN OF CUSTODY RECORD

COC #: D33409 Page 1 of 5

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.8, 8.7, 9.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T E H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE
1	2018-MW49-GP01	2018/07/17		Soil									X				X											
2	2018-MW49-GP02												X															
3	2018-MW46-GP01												X				X											
4	2018-MW46-GP04												X															
5	2018-MW47-GP01												X				X											
6	2018-MW47-GP02																				X							
7	2018-MW47-GP06																X				X							
8	2018-MW48-GP01																X						X					
9	2018-MW48-GP02												X															
10	2018-MW48-GP06	↓		↓									X				X											

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
				2018/07/24	8:50	B8I7049

Regulatory Requirements (Specify)

COMMENTS

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

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CHAIN OF CUSTODY RECORD

COC #: D33410 Page 2 of 5

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	☒ Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL Postal Code: A1B 0L2	Address: Postal Code:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Phone: 709 576 1458 Fax:	Phone: Fax:	Site Location: Border Beacon	DATE REQUIRED:
Email: James.Slade@Stantec	Email:	Site #:	
		Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.8, 8.7, 9.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Cteam sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-SS49	2018/07/19		soil													X				X								
2	2018-SS50	2018/07/19		soil									X				X				X								* FOR ALL
3	2018-MW01	2018/07/18		GW		X			X								X				X		X						REQUIRED LAB
4	2018-MW18	↓		↓		X			X								X				X		X						FILTRATION, Yellow
5	2018-MW50						X		X								X				X		X						CAPPED BOTTLE
6	2018-MW17						X		X								X				X		X						WAS RINSED THREE
7	2018-MW14					X			X								X				X		X						TIMES PRIOR TO
8	2018-MW09					X			X								X				X		X						SAMPLING.
9	2018-MW11					X			X								X				X		X						
10	2018-MW20			↓			X		X								X				X		X						

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			[signature]	2018/07/24	8:50	B8I7049

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CHAIN OF CUSTODY RECORD

COC #: D33411 Page 3 of 5

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St John's NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9, 8, 8.7, 9.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest -for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low-Level BTEX ,C6-C32	CCME Hydrocarbons (CWS,PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	2018-MW26	2018/07/18		GW			X		X								X				X		X						
2	2018-MW27	↓		↓			X		X								X				X		X						
3	2018-MW31						X		X								X				X		X						
4	2018-MW32						X		X								X				X		X						
5	2018-MW43	2018/07/19					X		X								X				X		X						
6	2018-MW41					X			X								X				X		X						
7	2018-MW39					X			X								X				X		X						
8	2018-MW37						X		X								X				X		X						
9	2018-MW34						X		X								X				X		X						
10	2018-MW33	↓		↓			X		X								X				X		X						

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CHAIN OF CUSTODY RECORD

COC #: D 33412 Page 4 of 5

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most Analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 7095761458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.8, 8.7, 9.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED &PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS (Total Metals) Well / Surface water	RCAP-MS (Dissolved Metals) Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.Coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify) / COMMENTS
1	~~MW~~ 2018-MW46	2018/07/19		GW			X		X								X				X		X						
2	2018-MW47	↓		↓			X		X								X				X		X						
3	2018-MW68	↓		↓			X		X								X				X		X						
4	2018-VEG-01			Tissue									X										X						
5	2018-VEG02			↓									X										X						
6	2018-VEG03												X										X						
7	2018-VEG04												X										X						
8	2018-VEG-05												X										X						
9	2018-VEG06												X										X						
10	2018-VEG07	↓		↓									X										X						

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			[signature]	2018/07/24	8:50	B8I7049

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CHAIN OF CUSTODY RECORD

COC #: D33498 Page 5 of 5

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Stantec	Company Name:	Quotation #:	[X] Regular TAT (5 business days) Most analyses
Contact Name: Jim Slade	Contact Name:	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 141 Kelsey Drive St Johns NL	Address:	Project #: 121414998	IF RUSH please specify date (Surcharges will be applied)
Postal Code: A1B 0L2	Postal Code:	Site Location: Border Beacon	DATE REQUIRED:
Phone: 709 576 1458 Fax:	Phone: Fax:	Site #:	
Email: James.Slade@stantec.com	Email:	Sampled By: AP/RP	

Laboratory Use Only

CUSTODY SEAL Present	CUSTODY SEAL Intact	COOLER TEMPERATURES	COOLER TEMPERATURES
		9.8, 8.7, 9.1	

COOLING MEDIA PRESENT Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED & PRESERVED	LAB FILTRATION REQUIRED	RCAP-MS [Total Metals] Well / Surface water	RCAP-MS [Dissolved Metals] Ground waters	Metals (Water): Total Digest (Default Method) for well water & surface water	Metals (Water): Dissolved for ground water	Metals (Water): Mercury (CIRCLE) TOTAL / DISSOLVED	Metals (Soil): Metals & Mercury Default Acid Extractable (Available) Digest	Metals (Soil): Metals Total Digest - for Ocean sediments (HNO3/HF/HClO4)	Metals (Soil): Mercury Low level by Cold Vapour AA	Metals (Soil): Hot Water Soluble Boron (required for CCME Agricultural/ Landfill)	RBCA Hydrocarbons (BTEX, C6-C32)	Hydrocarbons Soil (Potable), NS Fuel Oil Spill Policy Low Level BTEX ,C6-C32	CCME Hydrocarbons (CWS-PHC F1/BTEX, F2-F4)	NB Potable Water BTEX, VPH, Low level T.E.H	PAHs (Default for water/soil)	PAHs (FWAL /CCME Sediment)	PCBs	VOCs	Total Coliform/E.coli (Presence/Absence)	Total Coliform/E.coli (Count)		HOLD- DO NOT ANALYZE	Regulatory Requirements (Specify)
1	2018-VEG-08	2018/07/19		Tissue									X										X					
2																												
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY:(Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
			[signature]	2018/07/24	8:50	B8I7049

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APPENDIX H

NCSCS Evaluation Form

Table H.1 Human Health Screening for Chemicals in Soil - Lower Site
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Maximum Soil Concentration	HH Screening Guideline	EPC	Carried Forward?	Rationale
Metals						
Aluminum (Al)	mg/kg	9100	240000 [d]	-	N	Maximum concentration below applicable guideline
Antimony (Sb)	mg/kg	**19**	7.5 [c]	2.7	N	EPC below applicable guideline
Arsenic (As)	mg/kg	**45**	31 [a1]	3.4	N	EPC below applicable guideline
Barium (Ba)	mg/kg	220	10000 [a]	-	N	Maximum concentration below applicable guideline
Beryllium (Be)	mg/kg	<2	110 [a]	-	N	Not detected
Bismuth (Bi)	mg/kg	<2	NG [a]	-	N	Not considered toxic; not detected above RDL
Boron (B)	mg/kg	<50	4300 [c]	-	N	Not detected
Cadmium (Cd)	mg/kg	1.6	49 [a]	-	N	Maximum concentration below applicable guideline
Chromium (Cr)	mg/kg	15	630 [a]	-	N	Maximum concentration below applicable guideline
Cobalt (Co)	mg/kg	5.8	22 [c]	-	N	Maximum concentration below applicable guideline
Copper (Cu)	mg/kg	610	4000 [a]	-	N	Maximum concentration below applicable guideline
Iron (Fe)	mg/kg	17000	164000 [d]	-	N	Maximum concentration below applicable guideline
Lead (Pb)	mg/kg	180	260 [a]	-	N	Maximum concentration below applicable guideline
Lithium (Li)	mg/kg	14	460 [d]	-	N	Maximum concentration below applicable guideline
Manganese (Mn)	mg/kg	210	5200 [d]	-	N	Maximum concentration below applicable guideline
Mercury (Hg)	mg/kg	0.29	24 [a]	-	N	Maximum concentration below applicable guideline
Molybdenum (Mo)	mg/kg	<2	110 [c]	-	N	Not detected
Nickel (Ni)	mg/kg	11	310 [a]	-	N	Maximum concentration below applicable guideline
Rubidium (Rb)	mg/kg	9.3	NG	-	N	Not considered toxic
Selenium (Se)	mg/kg	<1	125 [a]	-	N	Not detected
Silver (Ag)	mg/kg	<0.5	77 [c]	-	N	Not detected
Strontium (Sr)	mg/kg	40	140000 [d]	-	N	Maximum concentration below applicable guideline
Thallium (Tl)	mg/kg	<0.1	1 [b]	-	N	Not detected
Tin (Sn)	mg/kg	33	140000 [d]	-	N	Maximum concentration below applicable guideline
Uranium (U)	mg/kg	1.1	33 [a]	-	N	Maximum concentration below applicable guideline
Vanadium (V)	mg/kg	25	39 [c]	-	N	Maximum concentration below applicable guideline
Zinc (Zn)	mg/kg	900	16000 [a]	-	-	Maximum concentration below applicable guideline
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.025	360 [e]	-	N	Not detected
Toluene	mg/kg	0.1	31000 [e]	-	N	Maximum concentration below applicable guideline
Ethylbenzene	mg/kg	<0.025	14000 [e]	-	N	Not detected
Xylene	mg/kg	8.5	210000 [e]	-	N	Maximum concentration below applicable guideline
TPH (gasoline)	mg/kg	-	22000 [e]	-	N	-
TPH (fuel oil)	mg/kg	**35000**	13000 [e]	2087	N	EPC below applicable guideline
TPH (lube oil)	mg/kg	6000	21000 [e]	-	N	Maximum concentration below applicable guideline
Polycyclic Aromatic Hydrocarbons						
Non-Carcinogenic PAHs						
Acenaphthene	mg/kg	0.26	8000 [b]	-	N	Maximum concentration below applicable guideline
Acenaphthylene	mg/kg	<0.16	7.8 [c]	-	N	Not detected
Anthracene	mg/kg	<0.02	37000 [b]	-	N	Not detected
Fluoranthene	mg/kg	0.025	5300 [b]	-	N	Maximum concentration below applicable guideline
Fluorene	mg/kg	0.15	4100 [b]	-	N	Maximum concentration below applicable guideline
1-Methylnaphthalene	mg/kg	1.1	72 [c]	-	N	Maximum concentration below applicable guideline
2-Methylnaphthalene	mg/kg	1.5	72 [c]	-	N	Maximum concentration below applicable guideline
Naphthalene	mg/kg	0.38	2800 [b]	-	N	Maximum concentration below applicable guideline
Perylene	mg/kg	<0.01	3200 [f]	-	N	No guideline; see footnote f below; Not detected
Phenanthrene	mg/kg	0.55	NG	-	N	No guideline; see footnote g below
Pyrene	mg/kg	0.028	3200 [b]	-	N	Maximum concentration below applicable guideline
Carcinogenic PAHs						
B[a]P TPE	mg/kg	0.013	5.3 [a]	-	N	Maximum B[a]P TPE below applicable guideline

Notes

NG = No guideline

B[a]P TPE = Benzo(a)pyrene Total Potency Equivalent

TEQ = Toxic Equivalency Quotient

[a] CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health; lowest applicable human health guideline for commercial land use and coarse-grained surface soils.

[a1] Human health guideline with a 10^{-5} incremental cancer risk.

[b] Alberta Tier I Soil Remediation Guidelines; lowest applicable human health guideline for commercial land use and coarse grained soils.

[c] MOECC Soil Components for Table 3 - Full Depth, Non-potable Water Scenario; lowest applicable human health guideline for residential land use and coarse textured soil.

[d] USEPA Regional Screening Levels for Composite Worker Soil; lowest applicable human health guideline. Hazard quotient values adjusted to 0.2, as applicable.

[e] Atlantic PIRI Tier I PSSL (soil Ingestion) for a commercial site with non-potable groundwater and coarse-grained soil

[f] There are no applicable guidelines for perylene ; pyrene has been selected as a surrogate for perylene on the basis of relevant toxicity data, target organs, dose-response information, and structure-activity considerations

[g] No toxicity reference value or guideline could be found for phenanthrene. Phenanthrene is a weak carcinogen and Health Canada (2010b) gives a TEF of 0.001. Therefore, phenanthrene was assessed as a carcinogenic using the TEF relative to benzo(a)pyrene.

Bold indicates a guideline exceedance and grey highlighting indicates the parameter is carried forward in the HHRA as a COPC.

Table H.2 Human Health Screening for Chemicals in Sediment - Lower Site
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Maximum Sediment Concentration	HH Screening Guideline	EPC	Carried Forward?	Rationale
Metals						
Aluminum (Al)	mg/kg	4600	15,600 [d]	-	N	Maximum concentration below applicable guideline
Antimony (Sb)	mg/kg	<2	7.5 [c]	-	N	Not detected
Arsenic (As)	mg/kg	<2	31 [a1]	-	N	Not detected
Barium (Ba)	mg/kg	110	6800 [a]	-	N	Maximum concentration below applicable guideline
Beryllium (Be)	mg/kg	<2	75 [a]	-	N	Not detected
Bismuth (Bi)	mg/kg	<2	NG	-	N	Not considered toxic; not detected above RDL
Boron (B)	mg/kg	<50	4300 [c]	-	N	Not detected
Cadmium (Cd)	mg/kg	<0.3	14 [a]	-	N	Not detected
Chromium (Cr)	mg/kg	17	220 [a]	-	N	Maximum concentration below applicable guideline
Cobalt (Co)	mg/kg	2.8	22 [c]	-	N	Maximum concentration below applicable guideline
Copper (Cu)	mg/kg	6	1100 [a]	-	N	Maximum concentration below applicable guideline
Iron (Fe)	mg/kg	**20000**	11000 [d]	-	N	See Section 11.1.1.3
Lead (Pb)	mg/kg	10	140 [a]	-	N	Maximum concentration below applicable guideline
Lithium (Li)	mg/kg	11	32 [d]	-	N	Maximum concentration below applicable guideline
Manganese (Mn)	mg/kg	**160**	38 [d]	-	N	See Section 11.1.1.3
Mercury (Hg)	mg/kg	<0.1	6.6 [a]	-	N	Not detected
Molybdenum (Mo)	mg/kg	<2	110 [c]	-	N	Not detected
Nickel (Ni)	mg/kg	3.8	200 [a]	-	N	Maximum concentration below applicable guideline
Rubidium (Rb)	mg/kg	8.9	NG	-	N	Not considered toxic
Selenium (Se)	mg/kg	<1	80 [a]	-	N	Not detected
Silver (Ag)	mg/kg	<0.5	77 [c]	-	N	Not detected
Strontium (Sr)	mg/kg	11	9400 [d]	-	N	Maximum concentration below applicable guideline
Thallium (Tl)	mg/kg	<0.1	1 [b]	-	N	Not detected
Tin (Sn)	mg/kg	<2	9400 [d]	-	N	Not detected
Uranium (U)	mg/kg	1.3	23 [a]	-	N	Maximum concentration below applicable guideline
Vanadium (V)	mg/kg	29	39 [c]	-	N	Maximum concentration below applicable guideline
Zinc (Zn)	mg/kg	38	10000 [a]	-	-	Maximum concentration below applicable guideline
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.025	66 [e]	-	N	Not detected
Toluene	mg/kg	<0.025	20000 [e]	-	N	Not detected
Ethylbenzene	mg/kg	<0.025	9300 [e]	-	N	Not detected
Xylene	mg/kg	<0.05	140000 [e]	-	N	Not detected
TPH (gasoline)	mg/kg	-	15000 [e]	-	N	-
TPH (fuel oil)	mg/kg	-	8600 [e]	-	N	-
TPH (lube oil)	mg/kg	30	14000 [e]	-	N	Maximum concentration below applicable guideline
Polycyclic Aromatic Hydrocarbons						
Non-Carcinogenic PAHs						
Acenaphthene	mg/kg	<0.01	5300 [b]	-	N	Not detected
Acenaphthylene	mg/kg	<0.01	7.8 [c]	-	N	Not detected
Anthracene	mg/kg	<0.01	24000 [b]	-	N	Not detected
Fluoranthene	mg/kg	<0.01	3500 [b]	-	N	Not detected
Fluorene	mg/kg	<0.01	2700 [b]	-	N	Not detected
1-Methylnaphthalene	mg/kg	<0.01	72 [c]	-	N	Not detected
2-Methylnaphthalene	mg/kg	<0.01	72 [c]	-	N	Not detected
Naphthalene	mg/kg	<0.01	1800 [b]	-	N	Not detected
Perylene	mg/kg	<0.01	2100 [f]	-	N	No guideline; see footnote f below; not detected
Phenanthrene	mg/kg	<0.01	NG	-	N	No guideline; see footnote g below; not detected
Pyrene	mg/kg	<0.01	2100 [b]	-	N	Not detected
Carcinogenic PAHs						
B[a]P TPE	mg/kg	<0.01	5.3 [a]	-	N	Not detected

Notes

NG = No guideline

B[a]P TPE = Benzo(a)pyrene Total Potency Equivalent

TEQ = Toxic Equivalency Quotient

[a] CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health; lowest applicable human health guideline for commercial land use and coarse-grained surface soils.

[a1] Human health guideline with a 10^{-5} incremental cancer risk.

[b] Alberta Tier I Soil Remediation Guidelines; lowest applicable human health guideline for commercial land use and coarse grained soils.

[c] MOECC Soil Components for Table 3 - Full Depth, Non-potable Water Scenario; lowest applicable human health guideline for industrial/commercial land use and coarse textured soil.

[d] USEPA Regional Screening Levels for Composite Worker Soil; lowest applicable human health guideline. Hazard quotient values adjusted to 0.2, as applicable.

[e] Atlantic PIRI Tier I PSSL (soil Ingestion) for a commercial site with non-potable groundwater and coarse-grained soil

[f] There are no applicable guidelines for perylene ; pyrene has been selected as a surrogate for perylene on the basis of relevant toxicity data, target organs, dose-response information, and structure-activity considerations

[g] No toxicity reference value or guideline could be found for phenanthrene. Phenanthrene is a weak carcinogen and Health Canada (2010b) gives a TEF of 0.001. Therefore, phenanthrene was assessed as a carcinogenic using the TEF relative to benzo(a)pyrene.

Bold indicates a guideline exceedance and grey highlighting indicates the parameter is carried forward in the HHRA as a COPC.

Table H.3 Human Health Screening for Chemicals in Surface Water - Lower Site
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Maximum Surface Water Concentration	Health Canada Drinking Water Quality Guidelines [a]	EPC	Carried Forward?	Rationale
Metals						
Aluminum	µg/L	190	4000 [d]	-	N	Maximum concentration below applicable guideline
Antimony	µg/L	<1	6	-	N	Not detected
Arsenic	µg/L	<1	10	-	N	Not detected
Barium	µg/L	36	1000	-	N	Maximum concentration below applicable guideline
Beryllium	µg/L	<1	4 [c]	-	N	Not detected
Boron	µg/L	<50	5000	-	N	Not detected
Cadmium	µg/L	0.038	5	-	N	Maximum concentration below applicable guideline
Calcium	µg/L	2700	NGR		N	No guideline required
Chromium	µg/L	<1	50	-	N	Not detected
Cobalt	µg/L	<0.4	3 [c]	-	N	Not detected
Copper	µg/L	<2	1000 [a, e]	-	N	Not detected
Iron	µg/L	**380**	300 [a, e]	-	Y	Maximum concentration exceeds applicable guideline
Lead	µg/L	0.97	10	-	N	Maximum concentration below applicable guideline
Magnesium	µg/L	390	NGR		N	No guideline required
Manganese	µg/L	12	50 [a, e]	-	N	Maximum concentration below applicable guideline
Molybdenum	µg/L	<2	70 [c]	-	N	Not detected
Nickel	µg/L	<2	100 [c]	-	N	Not detected
Phosphorus	µg/L	<100	NG		N	No guideline; not toxic; not detected
Potassium	µg/L	390	NG		N	No guideline; not toxic
Selenium	µg/L	<1	50	-	N	Not detected
Silver	µg/L	<0.1	NGR	-	N	No guideline required; not detected
Sodium	µg/L	850	200000 [b]		N	Maximum concentration below applicable guideline
Strontium	µg/L	16	2400 [d]	-	N	Maximum concentration below applicable guideline
Thallium	µg/L	<0.1	2 [c]	-	N	Not detected
Tin	µg/L	<2	2400 [d]	-	N	Not detected
Titanium	µg/L	14	NG		N	No guideline
Uranium	µg/L	<0.1	20	-	N	Not detected
Vanadium	µg/L	<2	6.2 [c]	-	N	Not detected
Zinc	µg/L	17	5000 [a, e]	-	N	Maximum concentration below applicable guideline
Petroleum Hydrocarbons						
Benzene	µg/L	<1	5	-	N	Not detected
Toluene	µg/L	<1	24 [a, e]	-	N	Not detected
Ethylbenzene	µg/L	<1	1.6 [a, e]	-	N	Not detected
Xylene	µg/L	<2	20 [a, e]	-	N	Not detected
TPH (gasoline)	µg/L	<100	4400	-	N	Not detected
TPH (fuel oil)	µg/L	<100	3200	-	N	Not detected
TPH (lube oil)	µg/L	<100	7800	-	N	Not detected
Polycyclic Aromatic Hydrocarbons						
Non-Carcinogenic PAHs						
Acenaphthene	µg/L	<0.01	1400 b		N	Not detected
Acenaphthylene	µg/L	<0.01	0.45 c		N	Not detected
Anthracene	µg/L	<0.01	NGR b		N	No guideline required; not detected
Fluoranthene	µg/L	<0.01	NGR b		N	No guideline required; not detected
Fluorene	µg/L	<0.01	940 b		N	Not detected
1-Methylnaphthalene	µg/L	<0.05	12 c		N	Not detected
2-Methylnaphthalene	µg/L	<0.01	12 c		N	Not detected
Naphthalene	µg/L	<0.2	470 b		N	Not detected
Perylene	µg/L	<0.01	710 b, f		N	Not detected
Phenanthrene	µg/L	<0.01	1 c		N	Not detected
Pyrene	µg/L	<0.01	710 b		N	Not detected
Non-Carcinogenic PAHs						
Benzo(a)Pyrene TPE	mg/kg	<0.01	0.01		N	Not detected

Notes

NG = No guideline

PEF = Potency Equivalence Factor

NGR=No guideline required

[a] Health Canada Guidelines for Canadian Drinking Water Quality; health-based maximum acceptable concentration.

[b] Alberta Tier I Groundwater Remediation Guidelines; potable guideline for commercial land use and coarse grained soils.

[c] MOECC Groundwater Components for Potable Water Scenario; GW1 guideline with coarse textured soil.

[d] USEPA Regional Screening Levels for Resident Tapwater; lowest applicable human health guideline. Hazard quotient values adjusted to 0.2, as applicable.

[e] Aesthetic Objective

Data Arsenic in Soil

	A	B	C	D	E	F
1	As	D_As	Sb	D_Sb	tph	D_tph
2	2	0	2	0	15	0
3	2	0	2	0	15	0
4	2	0	2	0	15	0
5	2	0	2	0	15	0
6	2	0	2	0	15	0
7	2	0	2	0	23	1
8	2	0	2	0	15	0
9	2	0	19	1	15	0
10	2	0	3.9	1	15	0
11	2	0	2	0	3200	1
12	2	0	2	0	4600	1
13	2	0	2	0	140	1
14	2	0	2	0	7800	1
15	2	0	2	0	51	1
16	2	0	2	1	6100	1
17	2	0	2	0	15	0
18	45	1	2	0	15	0
19	2	0	2	0	50	1
20	2	0	2	0	4300	1
21	2	0	2	0	15	0
22	2	0	2	0	15	0
23	2	0	2	0	15	0
24	2	0	2	0	98	1
25	2	0	2	0	1300	1
26	2	0	2	0	7600	1
27	2	0	5	1	150	1
28	2	0	12	1	1600	1
29	4.8	1	2	0	6300	1
30	3	1	2	0	15	0
31	2	0	2	0	1400	1
32	2	0	2	0	1500	1
33	2	0	2	0	3900	1
34	9.4	1	2	0	3200	1
35	2	0	2	0	15	0
36	2	0	2	0	70	1
37	2	0	2	0	6400	1
38	2	0	2	0	15	0
39	2	0	2	0	35000	1
40	2	0	2	0	15	0
41	2	0	2	0	220	1
42	2	0	2	0	15	0
43	2	0	2	0	15	0
44	2	0	2	0	15	0
45	2	0	2	0	15	0

	A	B	C	D	E	F
46	2	0	2	0	3300	1
47	2	0	2	0	15	0
48	2	0	2	0	15	0
49	2	0	2	0	15	0
50	2	0	2	0	15	0
51	2	0	2	0	15	0
52	2	0	2	0	24	1
53	2	0	2	0	15	0
54	2	0	2	0	130	1
55	2	0	2	0	400	1
56	2	0	2	0	1100	1
57	2	0	2	0	3200	1
58	2	0	2	0	300	1
59	2	0	2	0	260	1
60	2	0	2	0	620	1
61	2	0	2	0	200	1
62	2	0	2	0	15	0
63	2	0	2	0	3300	1
64	2	0	2	0	15	0
65	2	0	2	0	15	0
66	2	0	2	0	15	0
67	2	0	2	0	15	0
68	2	0	2	0	15	0
69	2	0	2	0	3800	1
70	2	0	2	0	33	1
71	2	0	2	0	15	0
72	2	0	2	0	29	1
73	2	0	2	0	15	0
74	2	0	2	0	1100	1
75	2	0	2	0	100	1
76	2	0	2	0	2300	1
77	2	0	2	0	15	0
78	2	0	2	0	1700	1
79	2	0	2	0	15	0
80	2	0	2	0	4400	1
81	2	0	2	0	15	0
82	2	0	2	0	15	0
83	2	0	2	0	15	0
84	2	0	2	0	630	1
85	2	0	2	0	15	0
86	2	0	2	0	19	1
87	2	0	2	0	1800	1
88	2	0	2	0	200	1
89	2	0	2	0	820	1
90	2	0	2	0	3700	1

	A	B	C	D	E	F
91	2	0	2	0	800	1
92	2	0	2	0	1700	1
93	2	0	2	0	7000	1
94	2	0	2	0	15	0
95	2	0	2	0	590	1
96					15	0
97					15	0
98					15	0
99					15	0
100					15	0
101					15	0
102					20	1
103					17	1
104					15	0
105					15	0
106					290	1
107					21	1
108					15	0
109					31	1
110					310	1
111					79	1
112					46	1
113					21	1
114					24	1
115					15	0
116					15	0
117					15	0
118					15	0
119					31	1
120					140	1
121					15	0
122					15	0
123					15	0
124					15	0
125					15	0
126					27	1
127					27	1
128					2600	1
129					15	0
130					30	1
131					15	0
132					26	1
133					15	0
134					15	0
135					15	0

	A	B	C	D	E	F
136					15	0
137					15	0
138					15	0
139					15	0
140					15	0
141					15	0
142					15	0
143					15	0
144					15	0
145					15	0
146					15	0
147					15	0
148					15	0
149					15	0
150					15	0
151					24	1
152					15	0
153					15	0

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.11/15/2019 1:39:51 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Sb

General Statistics

Total Number of Observations	111	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	2	Mean	2.468
Maximum	22	Median	2
SD	2.658	Std. Error of Mean	0.252
Coefficient of Variation	1.077	Skewness	6.33

Normal GOF Test

Shapiro Wilk Test Statistic	0.192	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.525	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0844	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.886	95% Adjusted-CLT UCL (Chen-1995)	3.045
		95% Modified-t UCL (Johnson-1978)	2.911

Gamma GOF Test

A-D Test Statistic	39.57	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.542	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.087	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.787	k star (bias corrected MLE)	3.691
Theta hat (MLE)	0.652	Theta star (bias corrected MLE)	0.669
nu hat (MLE)	840.8	nu star (bias corrected)	819.4
MLE Mean (bias corrected)	2.468	MLE Sd (bias corrected)	1.284
		Approximate Chi Square Value (0.05)	754
Adjusted Level of Significance	0.0478	Adjusted Chi Square Value	753.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2.682	95% Adjusted Gamma UCL (use when n<50)	2.685

	A	B	C	D	E	F	G	H	I	J	K	L
51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.216	**Shapiro Wilk Lognormal GOF Test**					
53					5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.533	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.0844	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	0.693	Mean of logged Data					0.765
60					Maximum of Logged Data	3.091	SD of logged Data					0.366
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	2.445	90% Chebyshev (MVUE) UCL					2.544
64					95% Chebyshev (MVUE) UCL	2.656	97.5% Chebyshev (MVUE) UCL					2.811
65					99% Chebyshev (MVUE) UCL	3.116						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	2.883	95% Jackknife UCL					2.886
72					95% Standard Bootstrap UCL	2.881	95% Bootstrap-t UCL					3.399
73					95% Hall's Bootstrap UCL	2.948	95% Percentile Bootstrap UCL					2.918
74					95% BCA Bootstrap UCL	3.08						
75					90% Chebyshev(Mean, Sd) UCL	3.225	95% Chebyshev(Mean, Sd) UCL					3.567
76					97.5% Chebyshev(Mean, Sd) UCL	4.043	99% Chebyshev(Mean, Sd) UCL					4.978
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	2.886	or 95% Modified-t UCL					2.911
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 9:29:31 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

As

General Statistics

Total Number of Observations	96	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	92
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	3	Minimum Non-Detect	2
Maximum Detect	45	Maximum Non-Detect	2
Variance Detects	392.7	Percent Non-Detects	95.83%
Mean Detects	15.55	SD Detects	19.82
Median Detects	7.1	CV Detects	1.274
Skewness Detects	1.892	Kurtosis Detects	3.612
Mean of Logged Detects	2.179	SD of Logged Detects	1.182

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.745	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.372	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.565	KM Standard Error of Mean	0.522
KM SD	4.428	95% KM (BCA) UCL	N/A
95% KM (t) UCL	3.431	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	3.423	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	4.13	95% KM Chebyshev UCL	4.839
97.5% KM Chebyshev UCL	5.823	99% KM Chebyshev UCL	7.756

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.426	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.666	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.299	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.402	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.019	k star (bias corrected MLE)	0.421
Theta hat (MLE)	15.26	Theta star (bias corrected MLE)	36.91
nu hat (MLE)	8.149	nu star (bias corrected)	3.371
Mean (detects)	15.55		

51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58				Minimum	0.01				Mean	0.658		
59				Maximum	45				Median	0.01		
60				SD	4.706				CV	7.157		
61				k hat (MLE)	0.19				k star (bias corrected MLE)	0.191		
62				Theta hat (MLE)	3.46				Theta star (bias corrected MLE)	3.442		
63				nu hat (MLE)	36.49				nu star (bias corrected)	36.68		
64				Adjusted Level of Significance (β)	0.0475							
65				Approximate Chi Square Value (36.68, α)	23.82				Adjusted Chi Square Value (36.68, β)	23.66		
66				95% Gamma Approximate UCL (use when n>=50)	1.013				95% Gamma Adjusted UCL (use when n<50)	N/A		
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69				Mean (KM)	2.565				SD (KM)	4.428		
70				Variance (KM)	19.6				SE of Mean (KM)	0.522		
71				k hat (KM)	0.335				k star (KM)	0.332		
72				nu hat (KM)	64.41				nu star (KM)	63.74		
73				theta hat (KM)	7.644				theta star (KM)	7.726		
74				80% gamma percentile (KM)	4.022				90% gamma percentile (KM)	7.464		
75				95% gamma percentile (KM)	11.35				99% gamma percentile (KM)	21.33		
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78				Approximate Chi Square Value (63.74, α)	46.37				Adjusted Chi Square Value (63.74, β)	46.14		
79				95% Gamma Approximate KM-UCL (use when n>=50)	3.525				95% Gamma Adjusted KM-UCL (use when n<50)	3.542		
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82				Shapiro Wilk Test Statistic	0.929				**Shapiro Wilk GOF Test**			
83				5% Shapiro Wilk Critical Value	0.748				Detected Data appear Lognormal at 5% Significance Level			
84				Lilliefors Test Statistic	0.229				**Lilliefors GOF Test**			
85				5% Lilliefors Critical Value	0.375				Detected Data appear Lognormal at 5% Significance Level			
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89				Mean in Original Scale	0.684				Mean in Log Scale	-7.893		
90				SD in Original Scale	4.704				SD in Log Scale	4.714		
91				95% t UCL (assumes normality of ROS data)	1.481				95% Percentile Bootstrap UCL	1.568		
92				95% BCA Bootstrap UCL	2.424				95% Bootstrap t UCL	6.281		
93				95% H-UCL (Log ROS)	803.2							
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96				KM Mean (logged)	0.755				KM Geo Mean	2.128		
97				KM SD (logged)	0.363				95% Critical H Value (KM-Log)	1.775		
98				KM Standard Error of Mean (logged)	0.0428				95% H-UCL (KM -Log)	2.428		
99				KM SD (logged)	0.363				95% Critical H Value (KM-Log)	1.775		
100				KM Standard Error of Mean (logged)	0.0428							

101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	1.606				Mean in Log Scale	0.0908	
105					SD in Original Scale	4.577				SD in Log Scale	0.485	
106					95% t UCL (Assumes normality)	2.382				95% H-Stat UCL	1.35	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					95% KM (t) UCL	3.431						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 9:41:10 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPH

General Statistics

Total Number of Observations	152	Number of Distinct Observations	59
Number of Detects	70	Number of Non-Detects	82
Number of Distinct Detects	58	Number of Distinct Non-Detects	1
Minimum Detect	17	Minimum Non-Detect	15
Maximum Detect	35000	Maximum Non-Detect	15
Variance Detects	20450648	Percent Non-Detects	53.95%
Mean Detects	2033	SD Detects	4522
Median Detects	355	CV Detects	2.224
Skewness Detects	5.861	Kurtosis Detects	41.68
Mean of Logged Detects	5.942	SD of Logged Detects	2.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.456	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.328	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.106	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	944.4	KM Standard Error of Mean	262.1
KM SD	3209	95% KM (BCA) UCL	1463
95% KM (t) UCL	1378	95% KM (Percentile Bootstrap) UCL	1435
95% KM (z) UCL	1376	95% KM Bootstrap t UCL	1793
90% KM Chebyshev UCL	1731	95% KM Chebyshev UCL	2087
97.5% KM Chebyshev UCL	2581	99% KM Chebyshev UCL	3553

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.91	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.843	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.134	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.114	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.394	k star (bias corrected MLE)	0.386
Theta hat (MLE)	5164	Theta star (bias corrected MLE)	5262
nu hat (MLE)	55.12	nu star (bias corrected)	54.09
Mean (detects)	2033		

51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	936.3	
59					Maximum	35000				Median	0.01	
60					SD	3222				CV	3.441	
61					k hat (MLE)	0.12				k star (bias corrected MLE)	0.122	
62					Theta hat (MLE)	7783				Theta star (bias corrected MLE)	7655	
63					nu hat (MLE)	36.57				nu star (bias corrected)	37.18	
64					Adjusted Level of Significance (β)	0.0484						
65					Approximate Chi Square Value (37.18, α)	24.22				Adjusted Chi Square Value (37.18, β)	24.12	
66					95% Gamma Approximate UCL (use when n>=50)	1437				95% Gamma Adjusted UCL (use when n<50)	1443	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	944.4				SD (KM)	3209	
70					Variance (KM)	10295411				SE of Mean (KM)	262.1	
71					k hat (KM)	0.0866				k star (KM)	0.0893	
72					nu hat (KM)	26.34				nu star (KM)	27.15	
73					theta hat (KM)	10901				theta star (KM)	10575	
74					80% gamma percentile (KM)	548.9				90% gamma percentile (KM)	2385	
75					95% gamma percentile (KM)	5503				99% gamma percentile (KM)	15864	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (27.15, α)	16.27				Adjusted Chi Square Value (27.15, β)	16.19	
79					95% Gamma Approximate KM-UCL (use when n>=50)	1576				95% Gamma Adjusted KM-UCL (use when n<50)	1584	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Approximate Test Statistic	0.908				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk P Value	2.0512E-5				Detected Data Not Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.12				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.106				Detected Data Not Lognormal at 5% Significance Level		
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	939				Mean in Log Scale	2.884	
90					SD in Original Scale	3221				SD in Log Scale	3.54	
91					95% t UCL (assumes normality of ROS data)	1371				95% Percentile Bootstrap UCL	1403	
92					95% BCA Bootstrap UCL	1670				95% Bootstrap t UCL	1781	
93					95% H-UCL (Log ROS)	43302						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	4.197				KM Geo Mean	66.5	
97					KM SD (logged)	2.149				95% Critical H Value (KM-Log)	3.481	
98					KM Standard Error of Mean (logged)	0.176				95% H-UCL (KM -Log)	1231	
99					KM SD (logged)	2.149				95% Critical H Value (KM-Log)	3.481	
100					KM Standard Error of Mean (logged)	0.176						

101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	940.4				Mean in Log Scale	3.823	
105					SD in Original Scale	3220				SD in Log Scale	2.427	
106					95% t UCL (Assumes normality)	1373				95% H-Stat UCL	1855	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Data do not follow a Discernible Distribution at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					95% KM (Chebyshev) UCL	2087						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

APPENDIX I

Ecological Risk Assessment

Screening Tables

TABLE I.1 **ECOLOGICAL SCREENING OF SOIL ANALYTICAL RESULTS (Lower Site)**
Border Beacon
Stantec Project No. 121414998

Parameter	Units	Max. Soil Concentration	CCME SQG [a]	EPC	Carried Forward?	Rationale
Metals						
Aluminium	mg/kg	9100	NG	-	N	Not considered toxic
Antimony	mg/kg	19	20 [b]	-	N	Maximum concentration below applicable guideline
Arsenic	mg/kg	**45**	17	3.4	N	Maximum concentration exceeds applicable guideline; EPC below guideline
Barium	mg/kg	220	750 [b]	-	N	Maximum concentration below applicable guideline
Beryllium	mg/kg	<2.0	5 [b]	-	N	Not detected
Bismuth	mg/kg	<2.0	NG	-	N	Not considered toxic; not detected
Boron (Hot water soluble)	mg/kg	<50	1.5 [c]	-	N	Not detected
Cadmium	mg/kg	1.6	3.8	-	N	Maximum concentration below applicable guideline
Chromium	mg/kg	15	64	-	N	Maximum concentration below applicable guideline
Cobalt	mg/kg	5.8	20 [b]	-	N	Maximum concentration below applicable guideline
Copper	mg/kg	**610**	63	41	N	Maximum concentration exceeds applicable guideline; EPC below guideline
Iron	mg/kg	17000	NG	-	N	Not considered toxic
Lead	mg/kg	**180**	70	27	N	Maximum concentration below applicable guideline; EPX below guideline
Lithium	mg/kg	14	NG	-	N	Not considered toxic
Manganese	mg/kg	210	NG	-	N	Not considered toxic
Mercury	mg/kg	0.29	12	-	N	Maximum concentration below applicable guideline
Molybdenum	mg/kg	<2.0	4 [b]	-	N	Not detected
Nickel	mg/kg	11	45	-	N	Maximum concentration below applicable guideline
Rubidium	mg/kg	9.3	NG	-	N	Not considered toxic
Selenium	mg/kg	0	1	-	N	Not detected
Silver	mg/kg	0	20 [b]	-	N	Not detected
Strontium	mg/kg	40	NG	-	N	Not considered toxic
Thallium	mg/kg	0	1	-	N	Not detected
Tin	mg/kg	**33**	5 [b]	3.4	N	Maximum concentration and EPC exceed applicable guideline
Uranium	mg/kg	1.1	33	-	N	Maximum concentration below applicable guideline
Vanadium	mg/kg	25	130	-	N	Maximum concentration below applicable guideline
Zinc	mg/kg	**900**	250	92	N	Maximum concentration exceeds applicable guideline; EPC below guideline
BTEX						
Benzene	mg/kg	0	18 d	-	N	Not detected
Toluene	mg/kg	0.098	75 d	-	N	Maximum concentration below applicable guideline
Ethylbenzene	mg/kg	0.96	55 d	-	N	Maximum concentration below applicable guideline
Total Xylenes	mg/kg	8.5	95 d	-	N	Maximum concentration below applicable guideline
Petroleum Hydrocarbons						
F1 (C6-C10) - BTEX	mg/kg	**620**	210 d	33	Y	Maximum concentration exceeds applicable guideline; EPC below guideline
F2 (C10-C16 Hydrocarbons)	mg/kg	**32000**	150 d	**1300**	Y	Maximum concentration and EPC exceed the applicable guideline
F3 (C16-C34 Hydrocarbons)	mg/kg	**4,600**	300 d	176	Y	Maximum concentration exceeds the applicable guideline
F4 (C34-C50 Hydrocarbons)	mg/kg	-	2800 d	-	N	Maximum concentration below applicable guideline

TABLE I.1 **ECOLOGICAL SCREENING OF SOIL ANALYTICAL RESULTS (Lower Site)**
Border Beacon
Stantec Project No. 121414998

Parameter	Units	Max. Soil Concentration	CCME SQG [a]	EPC	Carried Forward?	Rationale
Polycyclic Aromatic Hydrocarbons						
1-Methylnaphthalene	mg/kg	1.1	NG	1.1	Y	No applicable guideline, carried forward
2-Methylnaphthalene	mg/kg	1.5	NG	1.5	Y	No applicable guideline, carried forward
Acenaphthene	mg/kg	0.26	21.5 [c]	0.26	Y	Maximum concentration exceeds applicable guideline
Acenaphthylene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Anthracene	mg/kg	<0.01	2.5	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(a)anthracene	mg/kg	<0.01	6.2	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(a)pyrene	mg/kg	<0.01	20	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(b)fluoranthene	mg/kg	<0.01	6.2	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(g,h,i)perylene	mg/kg	<0.01	6.6 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(j)fluoranthene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Benzo(k)fluoranthene	mg/kg	<0.01	7.6 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Chrysene	mg/kg	0.012	6.2	0.012	Y	Maximum concentration exceeds applicable guideline
Dibenz(a,h)anthracene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Fluoranthene	mg/kg	0.025	50	0.025	Y	Maximum concentration exceeds applicable guideline
Fluorene	mg/kg	0.15	15.4	0.15	Y	Maximum concentration exceeds applicable guideline
Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	0.38 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Naphthalene	mg/kg	0.38	8.8	0.38	Y	Maximum concentration below applicable guideline
Perylene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Phenanthrene	mg/kg	0.55	43	0.55	Y	Maximum concentration exceeds applicable guideline
Pyrene	mg/kg	0.028	7.7	0.028	Y	Maximum concentration exceeds applicable guideline

Notes:

NG = No guideline

[a] CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health; lowest applicable ecological guideline for agricultural land use and coarse-grained surface soils.

[b] Alberta Tier I Soil Remediation Guidelines; lowest applicable ecological guideline foragricultural land use and coarse grained soils.

[c] MOECC Soil Components for Table 2 - Full Depth, lowest applicable ecological guideline for agricultural land use and coarse textured soil.

[d] Atlantic PIRI Tier I ESL: Lowest of ESL for protection of plants and soil inertebrates and ESL for protection of wildlife and livestock

[d] USEPA Ecological Soil Screening Levels; the lesser of plants, soil invertebrates, avian and mammalian values.

Bold indicates a guideline exceedance.

TABLE I.2 **ECOLOGICAL SCREENING OF SOIL ANALYTICAL RESULTS (Upper Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Max. Soil Concentration	CCME SQG [a]	EPC	Carried Forward?	Rationale
Metals						
Aluminium	mg/kg	100000	NG		N	Not considered toxic
Antimony	mg/kg	**57**	20 [b]	**57**	Y	Maximum concentration below applicable guideline
Arsenic	mg/kg	9	17		N	Maximum concentration exceeds applicable guideline
Barium	mg/kg	350	750 [b]		N	Maximum concentration below applicable guideline
Beryllium	mg/kg	<2	5 [b]		N	Maximum concentration below applicable guideline
Bismuth	mg/kg	280	NG		N	Not considered toxic; not detected
Boron (Hot water soluble)	mg/kg	**190**	1.5 [c]	**190**	Y	Not detected
Cadmium	mg/kg	**61**	3.8	**23**	Y	Maximum concentration below applicable guideline
Chromium	mg/kg	**190**	64	**83**	Y	Maximum concentration below applicable guideline
Cobalt	mg/kg	13	20 [b]		N	Maximum concentration below applicable guideline
Copper	mg/kg	**48000**	63	**16986**	Y	Maximum concentration exceeds applicable guideline
Iron	mg/kg	74000	NG		N	Not considered toxic
Lead	mg/kg	**2100**	70	**585**	Y	Maximum concentration below applicable guideline
Lithium	mg/kg	100	NG		N	Not considered toxic
Manganese	mg/kg	1400	NG		N	Not considered toxic
Mercury	mg/kg	<0.1	12		N	Maximum concentration below applicable guideline
Molybdenum	mg/kg	2	4 [b]		N	Maximum concentration below applicable guideline
Nickel	mg/kg	**510**	45	**163**	Y	Maximum concentration exceeds applicable guideline
Rubidium	mg/kg	110	NG		N	Not considered toxic
Selenium	mg/kg	**240**	1	**240**	Y	Maximum concentration exceeds applicable guideline
Silver	mg/kg	**150**	20 [b]	**150**	Y	Maximum concentration below applicable guideline
Strontium	mg/kg	25	NG		N	Not considered toxic
Thallium	mg/kg	1	1		N	Maximum concentration below applicable guideline
Tin	mg/kg	**1500**	5 [b]	**1500**	Y	Maximum concentration exceeds applicable guideline
Uranium	mg/kg	5	33		N	Maximum concentration below applicable guideline
Vanadium	mg/kg	41	130		N	Maximum concentration below applicable guideline
Zinc	mg/kg	**8000**	250	**2588**	Y	Maximum concentration below applicable guideline
BTEX						
Benzene	mg/kg	<0.025	18 d	-	N	Maximum concentration below applicable guideline
Toluene	mg/kg	0.035	75 d	-	N	Maximum concentration below applicable guideline
Ethylbenzene	mg/kg	<0.025	55 d	-	N	Maximum concentration below applicable guideline
Total Xylenes	mg/kg	0.1	95 d	-	N	Maximum concentration below applicable guideline
Petroleum Hydrocarbons						
F1 (C6-C10) - BTEX	mg/kg	3.4	210 d	3.4	Y	Maximum concentration below applicable guideline
F2 (C10-C16 Hydrocarbons)	mg/kg	790	150 d	**6835**	Y	Maximum concentration exceeds the applicable guideline
F3 (C16-C34 Hydrocarbons)	mg/kg	30,000	300 d	**8965**	Y	Maximum concentration exceeds the applicable guideline
F4 (C34-C50 Hydrocarbons)	mg/kg	-	2800 d		N	Maximum concentration below applicable guideline

TABLE I.2 **ECOLOGICAL SCREENING OF SOIL ANALYTICAL RESULTS (Upper Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Max. Soil Concentration	CCME SQG [a]	EPC	Carried Forward?	Rationale
Polycyclic Aromatic Hydrocarbons						
1-Methylnaphthalene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
2-Methylnaphthalene	mg/kg	0.018	NG	0.018	Y	No applicable guideline, carried forward
Acenaphthene	mg/kg	<0.01	21.5 [c]	<0.01	Y	Maximum concentration exceeds applicable guideline
Acenaphthylene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Anthracene	mg/kg	<0.01	2.5	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(a)anthracene	mg/kg	<0.01	6.2	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(a)pyrene	mg/kg	<0.01	20	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(b)fluoranthene	mg/kg	0.019	6.2	0.019	Y	Maximum concentration exceeds applicable guideline
Benzo(g,h,i)perylene	mg/kg	<0.01	6.6 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Benzo(j)fluoranthene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Benzo(k)fluoranthene	mg/kg	<0.01	7.6 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Chrysene	mg/kg	0.14	6.2	0.14	Y	Maximum concentration exceeds applicable guideline
Dibenz(a,h)anthracene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Fluoranthene	mg/kg	0.045	50	0.045	Y	Maximum concentration exceeds applicable guideline
Fluorene	mg/kg	<0.01	15.4	<0.01	Y	Maximum concentration exceeds applicable guideline
Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	0.38 c	<0.01	Y	Maximum concentration exceeds applicable guideline
Naphthalene	mg/kg	<0.01	8.8	<0.01	Y	Maximum concentration below applicable guideline
Perylene	mg/kg	<0.01	NG	<0.01	Y	No applicable guideline, carried forward
Phenanthrene	mg/kg	<0.01	43	<0.01	Y	Maximum concentration exceeds applicable guideline
Pyrene	mg/kg	0.21	7.7	0.21	Y	Maximum concentration exceeds applicable guideline

Notes:

NG = No guideline

[a] CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health; lowest applicable ecological guideline for agricultural land use and coarse-grained surface soils.

[b] Alberta Tier I Soil Remediation Guidelines; lowest applicable ecological guideline foragricultural land use and coarse grained soils.

[c] MOECC Soil Components for Table 2 - Full Depth, lowest applicable ecological guideline for agricultural land use and coarse textured soil.

[d] Atlantic PIRI Tier I ESL: Lowest of ESL for protection of plants and soil inertebrates and ESL for protection of wildlife and livestock

[d] USEPA Ecological Soil Screening Levels; the lesser of plants, soil invertebrates, avian and mammalian values.

Bold indicates a guideline exceedance.

TABLE I.3 **ECOLOGICAL SCREENING OF SEDIMENT ANALYTICAL RESULTS (Lower Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NI
Stantec Project No. 121414998

Parameter	Units	Maximum Sediment Concentration	CCME SedQG [a]	Carried Forward?	Rationale
Metals					
Aluminium	mg/kg	4600	NG	N	Not considered toxic
Antimony	mg/kg	<2	2 [d]	N	Maximum concentration below applicable guideline
Arsenic	mg/kg	<2	17	N	Maximum concentration below applicable guideline
Barium	mg/kg	110	130 [e]	N	Maximum concentration below applicable guideline
Beryllium	mg/kg	<2	NG	N	No guideline and below detection limit
Bismuth	mg/kg	<2	NG	N	No guideline and below detection limit
Boron (Hot water soluble)	mg/kg	<50	2 [c1]	N	Not detected
Cadmium	mg/kg	<0.3	3.5	N	Maximum concentration below applicable guideline
Chromium	mg/kg	17	90	N	Maximum concentration below applicable guideline
Cobalt	mg/kg	3	50 [d]	N	Maximum concentration below applicable guideline
Copper	mg/kg	6	197	N	Maximum concentration below applicable guideline
Iron	mg/kg	20000	NG	N	Not considered toxic
Lead	mg/kg	10	91.3	N	Maximum concentration below applicable guideline
Lithium	mg/kg	11	NG	N	Not considered toxic
Manganese	mg/kg	160	NG	N	Not considered toxic
Mercury	mg/kg	<0.1	0.486	N	Maximum concentration below applicable guideline
Molybdenum	mg/kg	<2	NG	N	No guideline and below detection limit
Nickel	mg/kg	4	16 [c]	N	Maximum concentration exceeds the applicable guideline
Rubidium	mg/kg	9	NG	N	Not considered toxic
Selenium	mg/kg	<1	2 [d]	N	Maximum concentration below applicable guideline
Silver	mg/kg	<0.5	1 [d]	N	Not detected
Strontium	mg/kg	11	NG	N	Not considered toxic
Thallium	mg/kg	<0.1	NG	N	No guideline and less than 5x the detection limit
Tin	mg/kg	<2	NG	N	No guideline and below detection limit
Uranium	mg/kg	1	NG	N	No guideline and not likely the result of Site activities
Vanadium	mg/kg	29	50 [e]	N	Maximum concentration below applicable guideline
Zinc	mg/kg	38	315	N	Maximum concentration below applicable guideline
BTEX					
Benzene	mg/kg	<0.025	1.2 [b]	N	Maximum concentration below applicable guideline
Toluene	mg/kg	<0.025	1.4 [b]	N	Maximum concentration below applicable guideline
Ethylbenzene	mg/kg	<0.025	1.2 [b]	N	Maximum concentration below applicable guideline
Total Xylenes	mg/kg	<0.05	1.3 [b]	N	Maximum concentration below applicable guideline
TPH	mg/kg	<15	15/25/43	N	Maximum concentration exceeds applicable guideline

TABLE I.3 **ECOLOGICAL SCREENING OF SEDIMENT ANALYTICAL RESULTS (Lower Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NI
Stantec Project No. 121414998

Parameter	Units	Maximum Sediment Concentration	CCME SedQG [a]	Carried Forward?	Rationale
Polycyclic Aromatic Hydrocarbons					
1-Methylnaphthalene	mg/kg	<0.01	0.201	N	Maximum concentration below applicable guideline
2-Methylnaphthalene	mg/kg	<0.01	0.201	N	Maximum concentration exceeds applicable guideline
Acenaphthene	mg/kg	<0.01	0.0889	N	Maximum concentration exceeds applicable guideline
Acenaphthylene	mg/kg	<0.01	0.128	N	Maximum concentration below applicable guideline
Anthracene	mg/kg	<0.01	0.245	N	Maximum concentration exceeds applicable guideline
Benzo(a)anthracene	mg/kg	<0.01	0.385	N	Maximum concentration exceeds applicable guideline
Benzo(a)pyrene	mg/kg	<0.01	0.782	N	Maximum concentration exceeds applicable guideline
Benzo(b)fluoranthene	mg/kg	<0.01	0.0272 [d]	N	Maximum concentration exceeds applicable guideline
Benzo(g,h,i)perylene	mg/kg	<0.01	0.17 [c]	N	Maximum concentration exceeds applicable guideline
Benzo(j)fluoranthene	mg/kg	<0.01	NG	N	No guideline; carried forward
Benzo(k)fluoranthene	mg/kg	<0.01	0.24 [c]	N	Maximum concentration exceeds applicable guideline
Chrysene	mg/kg	<0.01	0.862	N	Maximum concentration exceeds applicable guideline
Dibenz(a,h)anthracene	mg/kg	<0.01	0.135	N	Maximum concentration exceeds applicable guideline
Fluoranthene	mg/kg	<0.01	2.355	N	Maximum concentration exceeds applicable guideline
Fluorene	mg/kg	<0.01	0.144	N	Maximum concentration exceeds applicable guideline
Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	0.2 [c]	N	Maximum concentration exceeds applicable guideline
Naphthalene	mg/kg	<0.01	0.391	N	Maximum concentration exceeds applicable guideline
Perylene	mg/kg	<0.01	NG	N	No guideline; carried forward
Phenanthrene	mg/kg	<0.01	0.515	N	Maximum concentration exceeds applicable guideline
Pyrene	mg/kg	<0.01	0.875	N	Maximum concentration exceeds applicable guideline

Notes

NG = No guideline

[a] CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life; probable effects level (PEL)

[a1] The guideline for 2-methylnaphthalene was used as a surrogate for 1-methylnaphthalene based on similarities in chemical structure.

[b] Atlantic PIRI Tier I Sediment ESL for the Protection of Freshwater and Marine Aquatic Life

[c] MOECC Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario, May 2008; lowest effect level.

[c1] Value for hot water soluble boron guideline for soil used as a surrogate since this value is designed for the protection of plants and invertebrates.

[d] USEPA Region III BTAG, Freshwater Sediment Screening Benchmarks (8/2006).

[e] NOAA Screening Quick Reference Tables; freshwater sediment, most conservative value; marine value adopted if freshwater value unavailable.

Bold indicates a guideline exceedance.

TABLE I.4 **ECOLOGICAL SCREENING OF SURFACE WATER ANALYTICAL RESULTS (Lower Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Maximum Surface Water Concentration	CCME PFAL [a]	Carried Forward?	Rationale
Metals					
Aluminum	µg/L	61	100 [a1]	N	Maximum concentration below applicable guideline
Antimony	µg/L	<1	1600 [c]	N	Maximum concentration below applicable guideline
Arsenic	µg/L	<1	5	N	Maximum concentration below applicable guideline
Barium	µg/L	5	2300 [c]	N	Maximum concentration below applicable guideline
Beryllium	µg/L	<1	5.3 [c]	N	Maximum concentration below applicable guideline
Bismuth	µg/L	<2	NG	N	Maximum concentration below applicable guideline
Boron	µg/L	<50	1500	N	Maximum concentration below applicable guideline
Cadmium	µg/L	<0.017	0.09	N	Maximum concentration below applicable guideline
Calcium	µg/L	3810	116000 [d]	N	Maximum concentration below applicable guideline
Chromium	µg/L	<1	1	N	Maximum concentration below applicable guideline
Cobalt	µg/L	<0.4	2.5 [b]	N	Maximum concentration below applicable guideline
Copper	µg/L	<2	2.36 [a2]	N	Maximum concentration below applicable guideline
Iron	µg/L	<50	300	N	Maximum concentration below applicable guideline
Lead	µg/L	<0.5	3.18 [a2]	N	Maximum concentration below applicable guideline
Magnesium	µg/L	748	NG	N	Not considered toxic
Manganese	µg/L	2	120 [d]	N	Maximum concentration below applicable guideline
Molybdenum	µg/L	<2	73	N	Maximum concentration below applicable guideline
Nickel	µg/L	<2	95.58 [a2]	N	Maximum concentration below applicable guideline
Phosphorus	µg/L	<100	NG	N	Not considered toxic and below detection limit
Potassium	µg/L	276	NG	N	Not considered toxic
Selenium	µg/L	<1	1	N	Maximum concentration below applicable guideline
Silver	µg/L	<0.1	0.25	N	Maximum concentration below applicable guideline
Sodium	µg/L	2060	180000 [c]	N	Maximum concentration below applicable guideline
Strontium	µg/L	17	1500 [d]	N	Maximum concentration below applicable guideline
Thallium	µg/L	<0.1	0.8	N	Maximum concentration below applicable guideline
Tin	µg/L	<2	73 [d]	N	Maximum concentration below applicable guideline
Titanium	µg/L	<2	NG	N	No guideline and below detection limit
Uranium	µg/L	<0.1	15	N	Maximum concentration below applicable guideline
Vanadium	µg/L	<2	20 [c]	N	Maximum concentration below applicable guideline
Zinc	µg/L	<5	30	N	Maximum concentration below applicable guideline
BTEX					
Benzene	µg/L	<1	2100 e	N	Maximum concentration below applicable guideline
Toluene	µg/L	<1	770 e	N	Maximum concentration below applicable guideline
Ethylbenzene	µg/L	<1	320 e	N	Maximum concentration below applicable guideline
Total Xylenes	µg/L	<2	330 e	N	Maximum concentration below applicable guideline
TPH	µg/L	<100	1500/100/100 e	N	Maximum concentration below applicable guideline

TABLE I.4 **ECOLOGICAL SCREENING OF SURFACE WATER ANALYTICAL RESULTS (Lower Site)**
Human Health and Ecological Risk Assessment, Former US Military Site, Border Beacon, NL
Stantec Project No. 121414998

Parameter	Units	Maximum Surface Water Concentration	CCME PFAL [a]	Carried Forward?	Rationale
Polycyclic Aromatic Hydrocarbons					
1-methylnaphthalene	µg/L	<0.05	146 [c]	N	Maximum concentration below applicable guideline
2-methylnaphthalene	µg/L	<0.05	NG	N	No guideline and below detection limit
Acenaphthene	µg/L	<0.010	5.8	N	Maximum concentration below applicable guideline
Acenaphthylene	µg/L	<0.010	0.14 [c]	N	Maximum concentration below applicable guideline
Anthracene	µg/L	<0.010	0.012	N	Maximum concentration below applicable guideline
Benzo(a)anthracene	µg/L	<0.010	0.018	N	Maximum concentration below applicable guideline
Benzo(a)pyrene	µg/L	<0.010	0.015	N	Maximum concentration below applicable guideline
Benzo(b)fluoranthene	µg/L	<0.010	0.42 [c]	N	Maximum concentration below applicable guideline
Benzo(g,h,i)perylene	µg/L	<0.010	0.02 [c]	N	Maximum concentration below applicable guideline
Benzo(j)fluoranthene	µg/L	<0.010	NG	N	No guideline and below detection limit
Benzo(k)fluoranthene	µg/L	<0.010	0.14 [c]	N	Maximum concentration below applicable guideline
Chrysene	µg/L	<0.010	0.07 [c]	N	Maximum concentration below applicable guideline
Dibenz(a,h)anthracene	µg/L	<0.010	0.04 [c]	N	Maximum concentration below applicable guideline
Fluoranthene	µg/L	0.01	0.04	N	Maximum concentration below applicable guideline
Fluorene	µg/L	<0.010	3	N	Maximum concentration below applicable guideline
Indeno(1,2,3-cd)pyrene	µg/L	<0.010	0.14 [c]	N	Maximum concentration below applicable guideline
Naphthalene	µg/L	<0.10	1.1	N	Maximum concentration below applicable guideline
Perylene	µg/L	<0.010	NG	N	No guideline and below detection limit
Phenanthrene	µg/L	0.017	0.4	N	Maximum concentration below applicable guideline
Pyrene	µg/L	<0.010	0.025	N	Maximum concentration below applicable guideline

Notes:

NG = No guideline

[a] CCME Water Quality Guidelines for the Protection of Freshwater Aquatic Life

[a1] Based on pH values ranging from 8.80-8.97

[a2] Based on hardness values equal to 100

[b] Alberta Environmental Quality Guidelines for Alberta Surface Waters; chronic value for the protection of freshwater aquatic life

[b1] In lieu of available chronic values, acute screening values were used

[c] MOECC Aquatic Protection Values (APVs)

[d] USEPA Region 3 BTAG Freshwater Screening Benchmarks (7/2006)

[e] Atlantic PIRI Tier I Suarface Water and Groundwater ESL for the Protection of Freshwater and Marine Aquatic Life

Bold indicates a guideline exceedance.

ERA

Lower Site

Procul Input and Output
Lower Site

PHC Entire Site
Border Beacon
Project No: 121414998

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	F1	D_F1	F2	D_F2	F3	D_F3	arsenic	D_arsenic	copper	D_copper	lead	D_lead	zinc	D_zinc
2	2.5	0	5	1	25	0	2	0	6.6	1	14	1	34	1
3	2.5	0	10	0	25	0	2	0	3.8	1	5.8	1	22	1
4	2.5	0	10	0	25	0	2	0	4	1	7.8	1	23	1
5	2.5	0	10	0	25	0	2	0	2.9	1	7.5	1	24	1
6	2.5	0	10	0	25	0	2	0	4.9	1	6.6	1	32	1
7	2.5	0	10	0	23	1	2	0	3.6	1	5.7	1	26	1
8	2.5	0	10	0	25	0	2	0	18	1	7.6	1	89	1
9	2.5	0	10	0	25	0	2	0	5.8	1	12	1	53	1
10	2.5	0	10	0	25	0	2	0	4.1	1	7.9	1	25	1
11	2.5	0	10	0	25	0	2	0	13	1	48	1	120	1
12	2.5	0	2100	1	1000	1	2	0	10	1	18	1	110	1
13	2.5	0	56	1	4600	1	2	0	9.9	1	6.4	1	62	1
14	2.5	0	42	1	98	1	2	0	12	1	80	1	100	1
15	2.5	0	6300	1	1500	1	2	0	9.1	1	14	1	45	1
16	2.5	0	33	1	18	1	2	0	5.1	1	11	1	42	1
17	3.7	1	4300	1	1800	1	2	0	7.7	1	14	1	93	1
18	2.5	0	10	0	25	0	45	1	70	1	41	1	900	1
19	2.5	0	10	0	25	0	2	0	19	1	9.4	1	31	1
20	2.5	0	10	0	50	1	2	0	7.5	1	6.4	1	31	1
21	12	1	4100	1	230	1	2	0	11	1	8.4	1	91	1
22	2.5	0	10	0	25	0	2	0	5.4	1	12	1	43	1
23	2.5	0	10	0	25	0	2	0	5.7	1	8.5	1	33	1
24	2.5	0	10	0	25	0	2	0	3.3	1	6.1	1	30	1
25	2.5	0	10	0	97	1	2	0	4.4	1	8.4	1	28	1
26	65	1	1100	1	92	1	2	0	2.7	1	6.4	1	24	1
27	130	1	4600	1	2900	1	2	0	5.3	1	7.7	1	31	1
28	2.5	0	67	1	80	1	2	0	6.4	1	24	1	47	1
29	3.1	1	240	1	1400	1	4.8	1	18	1	180	1	93	1
30	23	1	3200	1	3100	1	3	1	610	1	180	1	120	1
31	2.5	0	10	0	25	0	2	0	8.2	1	20	1	43	1
32	27	1	1200	1	230	1	2	0	9.2	1	94	1	360	1
33	3.9	1	1400	1	140	1	2	0	7.7	1	5	1	28	1
34	54	1	3400	1	430	1	9.4	1	12	1	7.3	1	34	1
35	6.1	1	3200	1	630	1	2	0	8.6	1	6.6	1	40	1
36	2.5	0	10	0	25	0	2	0	4.3	1	12	1	25	1
37	2.5	0	12	1	57	1	2	0	4.5	1	4.6	1	22	1
38	89	1	5600	1	720	1	2	0	5.8	1	5.8	1	26	1
39	2.5	0	10	0	25	0	2	0	5.6	1	4.5	1	26	1
40	66	1	32000	1	2900	1	2	0	7.2	1	6.2	1	32	1
41	2.5	0	10	0	25	0	2	0	5.4	1	4.6	1	28	1
42	2.5	0	10	0	220	1	2	0	7.2	1	7.2	1	36	1
43	2.5	0	10	0	25	0	2	0	5.6	1	5.8	1	27	1
44	2.5	0	10	0	25	0	2	0	3.1	1	13	1	22	1
45	2.5	0	10	0	25	0	2	0	5.3	1	5.3	1	34	1
46	2.5	0	10	0	25	0	2	0	4	1	5.2	1	22	1
47	10	1	2800	1	490	1	2	0	2	0	4.4	1	17	1
48	2.5	0	10	0	25	0	2	0	2.3	1	6.3	1	25	1
49	2.5	0	10	0	25	0	2	0	15	1	6.5	1	40	1
50	2.5	0	10	0	25	0	2	0	8.5	1	11	1	41	1
51	2.5	0	10	0	25	0	2	0	4.3	1	5.4	1	24	1
52	2.5	0	10	0	25	0	2	0	4.8	1	14	1	23	1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	F1	D_F1	F2	D_F2	F3	D_F3	arsenic	D_arsenic	copper	D_copper	lead	D_lead	zinc	D_zinc
53	2.5	0	10	0	24	1	2	0	2.8	1	5.7	1	21	1
54	2.5	0	10	0	25	0	2	0	5.2	1	8.8	1	30	1
55	2.5	0	23	1	100	1	2	0	2	0	7.1	1	12	1
56	2.5	0	50	1	350	1	2	0	4.2	1	11	1	28	1
57	5.9	1	700	1	350	1	2	0	7.2	1	5.9	1	56	1
58	39	1	2500	1	650	1	2	0	2.4	1	7.9	1	22	1
59	2.5	0	200	1	110	1	2	0	2	0	4.4	1	15	1
60	2.5	0	19	1	240	1	2	0	2.1	1	5.2	1	16	1
61	12	1	550	1	60	1	2	0	5.9	1	8.1	1	31	1
62	2.5	0	75	1	130	1	2	0	16	1	15	1	44	1
63	2.5	0	10	0	25	0	2	0	3.1	1	6	1	21	1
64	71	1	3000	1	230	1	2	0	16	1	9.7	1	41	1
65	2.5	0	10	0	25	0	2	0	2	0	5.4	1	15	1
66	2.5	0	10	0	25	0	2	0	10	1	44	1	75	1
67	2.5	0	15	1	25	0	2	0	4.3	1	6.3	1	24	1
68	2.5	0	10	0	25	0	2	0	2.7	1	6.7	1	22	1
69	2.5	0	10	0	25	0	2	0	2	0	5.8	1	15	1
70	2.5	0	10	0	25	0	2	0	2	0	5.8	1	12	1
71	210	1	2800	1	740	1	2	0	6.3	1	15	1	43	1
72	33	1	10	0	25	0	2	0	3.5	1	6.6	1	20	1
73	2.5	0	10	0	25	0	2	0	2.4	1	6.9	1	20	1
74	16	1	13	1	25	0	2	0	2	0	6.1	1	15	1
75	2.5	0	10	0	25	0	2	0	3.3	1	8.2	1	26	1
76	130	1	900	1	87	1	2	0	8.2	1	7	1	38	1
77	22	1	41	1	39	1	2	0	6.9	1	5.6	1	41	1
78	230	1	1800	1	250	1	2	0	3.6	1	5	1	27	1
79	2.5	0	10	0	25	0	2	0	4.5	1	6.7	1	29	1
80	41	1	1500	1	190	1	2	0	7.7	1	5.4	1	31	1
81	2.5	0	10	0	25	0	2	0	5.2	1	5.5	1	29	1
82	620	1	3700	1	58	1	2	0	9.2	1	5.8	1	38	1
83	2.5	0	10	0	25	0	2	0	3.8	1	5.5	1	32	1
84	2.5	0	10	0	25	0	2	0	5.9	1	4.6	1	27	1
85	2.5	0	550	1	82	1	2	0	3.2	1	6.2	1	18	1
86	3.6	1	17	1	25	0	2	0	3.9	1	5.2	1	22	1
87	110	1	1600	1	140	1	2	0	6.9	1	8.4	1	30	1
88	180	1	19	1	25	0	2	0	6.6	1	6.1	1	26	1
89	23	1	620	1	180	1	2	0	5.9	1	5.4	1	35	1
90	77	1	3100	1	480	1	2	0	56	1	9.8	1	98	1
91	9.1	1	720	1	80	1	2	0	3.8	1	7.2	1	27	1
92	2.5	0	31	1	1300	1	2	0	4.6	1	5.6	1	26	1
93	97	1	1500	1	100	1	2	0	9.1	1	8.3	1	22	1
94	230	1	5800	1	950	1	2	0	6.9	1	5.3	1	28	1
95	2.5	0	10	0	25	0	2	0	6.8	1	6.8	1	26	1
96	86	1	430	1	80	1	2	0	7.2	1	7.8	1	30	1
97	2.5	0	10	0	25	0	2	0	5.4	1	6.9	1	31	1
98	2.5	0	10	0	25	0								
99	2.5	0	10	0	25	0								
100	2.5	0	10	0	25	0								
101	2.5	0	10	0	25	0								
102	2.5	0	10	0	25	0								
103	2.5	0	10	0	20	1								

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	F1	D_F1	F2	D_F2	F3	D_F3	arsenic	D_arsenic	copper	D_copper	lead	D_lead	zinc	D_zinc
104	2.5	0	10	0	17	1								
105	2.5	0	10	0	25	0								
106	2.5	0	10	0	25	0								
107	2.5	0	10	0	290	1								
108	2.5	0	10	0	21	1								
109	2.5	0	10	0	25	0								
110	2.5	0	10	0	31	1								
111	2.5	0	10	0	310	1								
112	2.5	0	10	0	79	1								
113	2.5	0	10	0	46	1								
114	2.5	0	10	0	21	1								
115	2.5	0	10	0	24	1								
116	2.5	0	10	0	25	0								
117	2.5	0	10	0	25	0								
118	2.5	0	10	0	25	0								
119	2.5	0	10	0	25	0								
120	2.5	0	10	0	31	1								
121	2.5	0	10	0	140	1								
122	2.5	0	10	0	25	0								
123	2.5	0	10	0	25	0								
124	2.5	0	10	0	25	0								
125	2.5	0	10	0	25	0								
126	2.5	0	10	0	25	0								
127	2.5	0	10	0	27	1								
128	2.5	0	10	0	27	1								
129	140	1	2000	1	520	1								
130	2.5	0	10	0	25	0								
131	2.5	0	10	0	30	1								
132	2.5	0	10	0	25	0								
133	2.5	0	10	0	26	1								
134	2.5	0	10	0	25	0								
135	2.5	0	10	0	25	0								
136	2.5	0	10	0	25	0								
137	2.5	0	10	0	25	0								
138	2.5	0	10	0	25	0								
139	2.5	0	10	0	25	0								
140	2.5	0	10	0	25	0								
141	2.5	0	10	0	25	0								
142	2.5	0	10	0	25	0								
143	2.5	0	10	0	25	0								
144	2.5	0	10	0	25	0								
145	2.5	0	10	0	25	0								
146	2.5	0	10	0	25	0								
147	2.5	0	10	0	25	0								
148	2.5	0	10	0	25	0								
149	2.5	0	10	0	25	0								
150	2.5	0	10	0	25	0								
151	2.5	0	10	0	25	0								
152	2.5	0	10	0	25	0								
153	2.5	0	10	0	24	1								
154	2.5	0	10	0	25	0								

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**F1**	**D_F1**	**F2**	**D_F2**	**F3**	**D_F3**	**arsenic**	**D_arsenic**	**copper**	**D_copper**	**lead**	**D_lead**	**zinc**	**D_zinc**
155	2.5	0	10	0	25	0								

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 12:01:22 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

As

General Statistics

Total Number of Observations	96	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	92
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	3	Minimum Non-Detect	2
Maximum Detect	45	Maximum Non-Detect	2
Variance Detects	392.7	Percent Non-Detects	95.83%
Mean Detects	15.55	SD Detects	19.82
Median Detects	7.1	CV Detects	1.274
Skewness Detects	1.892	Kurtosis Detects	3.612
Mean of Logged Detects	2.179	SD of Logged Detects	1.182

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.745	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.372	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.565	KM Standard Error of Mean	0.522
KM SD	4.428	95% KM (BCA) UCL	N/A
95% KM (t) UCL	3.431	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	3.423	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	4.13	95% KM Chebyshev UCL	4.839
97.5% KM Chebyshev UCL	5.823	99% KM Chebyshev UCL	7.756

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.426	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.666	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.299	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.402	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.019	k star (bias corrected MLE)	0.421
Theta hat (MLE)	15.26	Theta star (bias corrected MLE)	36.91
nu hat (MLE)	8.149	nu star (bias corrected)	3.371
Mean (detects)	15.55		

51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	0.658
59					Maximum	45					Median	0.01
60					SD	4.706					CV	7.157
61					k hat (MLE)	0.19					k star (bias corrected MLE)	0.191
62					Theta hat (MLE)	3.46					Theta star (bias corrected MLE)	3.442
63					nu hat (MLE)	36.49					nu star (bias corrected)	36.68
64					Adjusted Level of Significance (β)	0.0475						
65					Approximate Chi Square Value (36.68, α)	23.82					Adjusted Chi Square Value (36.68, β)	23.66
66					95% Gamma Approximate UCL (use when n>=50)	1.013					95% Gamma Adjusted UCL (use when n<50)	N/A
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	2.565					SD (KM)	4.428
70					Variance (KM)	19.6					SE of Mean (KM)	0.522
71					k hat (KM)	0.335					k star (KM)	0.332
72					nu hat (KM)	64.41					nu star (KM)	63.74
73					theta hat (KM)	7.644					theta star (KM)	7.726
74					80% gamma percentile (KM)	4.022					90% gamma percentile (KM)	7.464
75					95% gamma percentile (KM)	11.35					99% gamma percentile (KM)	21.33
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (63.74, α)	46.37					Adjusted Chi Square Value (63.74, β)	46.14
79					95% Gamma Approximate KM-UCL (use when n>=50)	3.525					95% Gamma Adjusted KM-UCL (use when n<50)	3.542
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.929					**Shapiro Wilk GOF Test**	
83					5% Shapiro Wilk Critical Value	0.748					Detected Data appear Lognormal at 5% Significance Level	
84					Lilliefors Test Statistic	0.229					**Lilliefors GOF Test**	
85					5% Lilliefors Critical Value	0.375					Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	0.684					Mean in Log Scale	-7.893
90					SD in Original Scale	4.704					SD in Log Scale	4.714
91					95% t UCL (assumes normality of ROS data)	1.481					95% Percentile Bootstrap UCL	1.596
92					95% BCA Bootstrap UCL	2.164					95% Bootstrap t UCL	6.482
93					95% H-UCL (Log ROS)	803.2						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	0.755					KM Geo Mean	2.128
97					KM SD (logged)	0.363					95% Critical H Value (KM-Log)	1.775
98					KM Standard Error of Mean (logged)	0.0428					95% H-UCL (KM -Log)	2.428
99					KM SD (logged)	0.363					95% Critical H Value (KM-Log)	1.775
100					KM Standard Error of Mean (logged)	0.0428						

101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	1.606				Mean in Log Scale	0.0908	
105					SD in Original Scale	4.577				SD in Log Scale	0.485	
106					95% t UCL (Assumes normality)	2.382				95% H-Stat UCL	1.35	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					95% KM (t) UCL	3.431						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												
123	**Cu**											
124												
125	**General Statistics**											
126					Total Number of Observations	96				Number of Distinct Observations	56	
127					Number of Detects	89				Number of Non-Detects	7	
128					Number of Distinct Detects	55				Number of Distinct Non-Detects	1	
129					Minimum Detect	2.1				Minimum Non-Detect	2	
130					Maximum Detect	610				Maximum Non-Detect	2	
131					Variance Detects	4158				Percent Non-Detects	7.292%	
132					Mean Detects	14.68				SD Detects	64.49	
133					Median Detects	5.8				CV Detects	4.393	
134					Skewness Detects	9.154				Kurtosis Detects	85.27	
135					Mean of Logged Detects	1.865				SD of Logged Detects	0.783	
136												
137	**Normal GOF Test on Detects Only**											
138					Shapiro Wilk Test Statistic	0.167	**Normal GOF Test on Detected Observations Only**					
139					5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level					
140					Lilliefors Test Statistic	0.44	**Lilliefors GOF Test**					
141					5% Lilliefors Critical Value	0.0941	Detected Data Not Normal at 5% Significance Level					
142	**Detected Data Not Normal at 5% Significance Level**											
143												
144	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
145					KM Mean	13.76				KM Standard Error of Mean	6.346	
146					KM SD	61.83				95% KM (BCA) UCL	26.86	
147					95% KM (t) UCL	24.3				95% KM (Percentile Bootstrap) UCL	26.28	
148					95% KM (z) UCL	24.19				95% KM Bootstrap t UCL	87.8	
149					90% KM Chebyshev UCL	32.79				95% KM Chebyshev UCL	41.42	
150					97.5% KM Chebyshev UCL	53.39				99% KM Chebyshev UCL	76.9	

151												
152	**Gamma GOF Tests on Detected Observations Only**											
153					A-D Test Statistic	14.39	**Anderson-Darling GOF Test**					
154					5% A-D Critical Value	0.795	Detected Data Not Gamma Distributed at 5% Significance Level					
155					K-S Test Statistic	0.316	**Kolmogorov-Smirnov GOF**					
156					5% K-S Critical Value	0.0986	Detected Data Not Gamma Distributed at 5% Significance Level					
157	**Detected Data Not Gamma Distributed at 5% Significance Level**											
158												
159	**Gamma Statistics on Detected Data Only**											
160					k hat (MLE)	0.731	k star (bias corrected MLE)	0.714				
161					Theta hat (MLE)	20.07	Theta star (bias corrected MLE)	20.56				
162					nu hat (MLE)	130.2	nu star (bias corrected)	127.1				
163					Mean (detects)	14.68						
164												
165	**Gamma ROS Statistics using Imputed Non-Detects**											
166	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
167	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
168	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
169	This is especially true when the sample size is small.											
170	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
171					Minimum	0.01	Mean	13.61				
172					Maximum	610	Median	5.5				
173					SD	62.18	CV	4.569				
174					k hat (MLE)	0.519	k star (bias corrected MLE)	0.509				
175					Theta hat (MLE)	26.24	Theta star (bias corrected MLE)	26.72				
176					nu hat (MLE)	99.59	nu star (bias corrected)	97.81				
177					Adjusted Level of Significance (β)	0.0475						
178					Approximate Chi Square Value (97.81, α)	76	Adjusted Chi Square Value (97.81, β)	75.71				
179					95% Gamma Approximate UCL (use when n>=50)	17.52	95% Gamma Adjusted UCL (use when n<50)	17.58				
180												
181	**Estimates of Gamma Parameters using KM Estimates**											
182					Mean (KM)	13.76	SD (KM)	61.83				
183					Variance (KM)	3823	SE of Mean (KM)	6.346				
184					k hat (KM)	0.0495	k star (KM)	0.0549				
185					nu hat (KM)	9.503	nu star (KM)	10.54				
186					theta hat (KM)	277.9	theta star (KM)	250.6				
187					80% gamma percentile (KM)	2.548	90% gamma percentile (KM)	23.53				
188					95% gamma percentile (KM)	75.39	99% gamma percentile (KM)	288.1				
189												
190	**Gamma Kaplan-Meier (KM) Statistics**											
191					Approximate Chi Square Value (10.54, α)	4.282	Adjusted Chi Square Value (10.54, β)	4.221				
192					95% Gamma Approximate KM-UCL (use when n>=50)	33.86	95% Gamma Adjusted KM-UCL (use when n<50)	34.35				
193												
194	**Lognormal GOF Test on Detected Observations Only**											
195					Shapiro Wilk Approximate Test Statistic	0.81	**Shapiro Wilk GOF Test**					
196					5% Shapiro Wilk P Value	1.110E-16	Detected Data Not Lognormal at 5% Significance Level					
197					Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**					
198					5% Lilliefors Critical Value	0.0941	Detected Data Not Lognormal at 5% Significance Level					
199	**Detected Data Not Lognormal at 5% Significance Level**											
200												

201	**Lognormal ROS Statistics Using Imputed Non-Detects**											
202					Mean in Original Scale	13.7				Mean in Log Scale		1.745
203					SD in Original Scale	62.16				SD in Log Scale		0.87
204					95% t UCL (assumes normality of ROS data)	24.24				95% Percentile Bootstrap UCL		26.08
205					95% BCA Bootstrap UCL	35.77				95% Bootstrap t UCL		96.63
206					95% H-UCL (Log ROS)	10.11						
207												
208	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
209					KM Mean (logged)	1.78				KM Geo Mean		5.927
210					KM SD (logged)	0.809				95% Critical H Value (KM-Log)		2.078
211					KM Standard Error of Mean (logged)	0.083				95% H-UCL (KM -Log)		9.771
212					KM SD (logged)	0.809				95% Critical H Value (KM-Log)		2.078
213					KM Standard Error of Mean (logged)	0.083						
214												
215	**DL/2 Statistics**											
216					**DL/2 Normal**					**DL/2 Log-Transformed**		
217					Mean in Original Scale	13.68				Mean in Log Scale		1.729
218					SD in Original Scale	62.17				SD in Log Scale		0.897
219					95% t UCL (Assumes normality)	24.22				95% H-Stat UCL		10.28
220	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
221												
222	**Nonparametric Distribution Free UCL Statistics**											
223	**Data do not follow a Discernible Distribution at 5% Significance Level**											
224												
225	**Suggested UCL to Use**											
226					95% KM (Chebyshev) UCL	41.42						
227												
228	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
229	Recommendations are based upon data size, data distribution, and skewness.											
230	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
231	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
232												
233												
234	**Pb**											
235												
236	**General Statistics**											
237					Total Number of Observations	96				Number of Distinct Observations		54
238										Number of Missing Observations		0
239					Minimum	4.4				Mean		14.28
240					Maximum	180				Median		6.85
241					SD	27.73				Std. Error of Mean		2.831
242					Coefficient of Variation	1.942				Skewness		5.009
243												
244	**Normal GOF Test**											
245					Shapiro Wilk Test Statistic	0.35				**Shapiro Wilk GOF Test**		
246					5% Shapiro Wilk P Value	0				Data Not Normal at 5% Significance Level		
247					Lilliefors Test Statistic	0.385				**Lilliefors GOF Test**		
248					5% Lilliefors Critical Value	0.0907				Data Not Normal at 5% Significance Level		
249	**Data Not Normal at 5% Significance Level**											
250												

251	**Assuming Normal Distribution**											
252	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
253				95% Student's-t UCL		18.98				95% Adjusted-CLT UCL (Chen-1995)		20.48
254										95% Modified-t UCL (Johnson-1978)		19.22
255												
256	**Gamma GOF Test**											
257				A-D Test Statistic		14.97	**Anderson-Darling Gamma GOF Test**					
258				5% A-D Critical Value		0.779	Data Not Gamma Distributed at 5% Significance Level					
259				K-S Test Statistic		0.294	**Kolmogorov-Smirnov Gamma GOF Test**					
260				5% K-S Critical Value		0.0938	Data Not Gamma Distributed at 5% Significance Level					
261	**Data Not Gamma Distributed at 5% Significance Level**											
262												
263	**Gamma Statistics**											
264				k hat (MLE)		1.156				k star (bias corrected MLE)		1.127
265				Theta hat (MLE)		12.36				Theta star (bias corrected MLE)		12.68
266				nu hat (MLE)		221.9				nu star (bias corrected)		216.3
267				MLE Mean (bias corrected)		14.28				MLE Sd (bias corrected)		13.46
268										Approximate Chi Square Value (0.05)		183.3
269				Adjusted Level of Significance		0.0475				Adjusted Chi Square Value		182.8
270												
271	**Assuming Gamma Distribution**											
272				95% Approximate Gamma UCL (use when n>=50))		16.86				95% Adjusted Gamma UCL (use when n<50)		16.9
273												
274	**Lognormal GOF Test**											
275				Shapiro Wilk Test Statistic		0.71	**Shapiro Wilk Lognormal GOF Test**					
276				5% Shapiro Wilk P Value		0	Data Not Lognormal at 5% Significance Level					
277				Lilliefors Test Statistic		0.234	**Lilliefors Lognormal GOF Test**					
278				5% Lilliefors Critical Value		0.0907	Data Not Lognormal at 5% Significance Level					
279	**Data Not Lognormal at 5% Significance Level**											
280												
281	**Lognormal Statistics**											
282				Minimum of Logged Data		1.482				Mean of logged Data		2.168
283				Maximum of Logged Data		5.193				SD of logged Data		0.734
284												
285	**Assuming Lognormal Distribution**											
286				95% H-UCL		13.34				90% Chebyshev (MVUE) UCL		14.25
287				95% Chebyshev (MVUE) UCL		15.54				97.5% Chebyshev (MVUE) UCL		17.33
288				99% Chebyshev (MVUE) UCL		20.86						
289												
290	**Nonparametric Distribution Free UCL Statistics**											
291	**Data do not follow a Discernible Distribution (0.05)**											
292												
293	**Nonparametric Distribution Free UCLs**											
294				95% CLT UCL		18.94				95% Jackknife UCL		18.98
295				95% Standard Bootstrap UCL		18.77				95% Bootstrap-t UCL		24.23
296				95% Hall's Bootstrap UCL		23.42				95% Percentile Bootstrap UCL		19.37
297				95% BCA Bootstrap UCL		20.86						
298				90% Chebyshev(Mean, Sd) UCL		22.77				95% Chebyshev(Mean, Sd) UCL		26.62
299				97.5% Chebyshev(Mean, Sd) UCL		31.96				99% Chebyshev(Mean, Sd) UCL		42.45
300												

301	**Suggested UCL to Use**											
302			95% Chebyshev (Mean, Sd) UCL			26.62						
303												
304	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
305	Recommendations are based upon data size, data distribution, and skewness.											
306	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
307	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
308												
309												
310	**Zn**											
311												
312	**General Statistics**											
313					Total Number of Observations	96			Number of Distinct Observations	43		
314									Number of Missing Observations	0		
315					Minimum	12			Mean	49.08		
316					Maximum	900			Median	29.5		
317					SD	96.68			Std. Error of Mean	9.867		
318					Coefficient of Variation	1.97			Skewness	7.693		
319												
320	**Normal GOF Test**											
321					Shapiro Wilk Test Statistic	0.299			**Shapiro Wilk GOF Test**			
322					5% Shapiro Wilk P Value	0			Data Not Normal at 5% Significance Level			
323					Lilliefors Test Statistic	0.352			**Lilliefors GOF Test**			
324					5% Lilliefors Critical Value	0.0907			Data Not Normal at 5% Significance Level			
325	**Data Not Normal at 5% Significance Level**											
326												
327	**Assuming Normal Distribution**											
328					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
329					95% Student's-t UCL	65.47			95% Adjusted-CLT UCL (Chen-1995)	73.59		
330									95% Modified-t UCL (Johnson-1978)	66.76		
331												
332	**Gamma GOF Test**											
333					A-D Test Statistic	10.12			**Anderson-Darling Gamma GOF Test**			
334					5% A-D Critical Value	0.771			Data Not Gamma Distributed at 5% Significance Level			
335					K-S Test Statistic	0.264			**Kolmogorov-Smirnov Gamma GOF Test**			
336					5% K-S Critical Value	0.0931			Data Not Gamma Distributed at 5% Significance Level			
337	**Data Not Gamma Distributed at 5% Significance Level**											
338												
339	**Gamma Statistics**											
340					k hat (MLE)	1.481			k star (bias corrected MLE)	1.442		
341					Theta hat (MLE)	33.14			Theta star (bias corrected MLE)	34.04		
342					nu hat (MLE)	284.4			nu star (bias corrected)	276.9		
343					MLE Mean (bias corrected)	49.08			MLE Sd (bias corrected)	40.88		
344									Approximate Chi Square Value (0.05)	239.3		
345					Adjusted Level of Significance	0.0475			Adjusted Chi Square Value	238.8		
346												
347	**Assuming Gamma Distribution**											
348					95% Approximate Gamma UCL (use when n>=50))	56.78			95% Adjusted Gamma UCL (use when n<50)	56.91		
349												
350	**Lognormal GOF Test**											

351					Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk Lognormal GOF Test**					
352					5% Shapiro Wilk P Value	5.551E-16	Data Not Lognormal at 5% Significance Level					
353					Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**					
354					5% Lilliefors Critical Value	0.0907	Data Not Lognormal at 5% Significance Level					
355	**Data Not Lognormal at 5% Significance Level**											
356												
357	**Lognormal Statistics**											
358					Minimum of Logged Data	2.485	Mean of logged Data	3.519				
359					Maximum of Logged Data	6.802	SD of logged Data	0.65				
360												
361	**Assuming Lognormal Distribution**											
362					95% H-UCL	47.55	90% Chebyshev (MVUE) UCL	50.63				
363					95% Chebyshev (MVUE) UCL	54.72	97.5% Chebyshev (MVUE) UCL	60.4				
364					99% Chebyshev (MVUE) UCL	71.55						
365												
366	**Nonparametric Distribution Free UCL Statistics**											
367	**Data do not follow a Discernible Distribution (0.05)**											
368												
369	**Nonparametric Distribution Free UCLs**											
370					95% CLT UCL	65.31	95% Jackknife UCL	65.47				
371					95% Standard Bootstrap UCL	65.06	95% Bootstrap-t UCL	104.9				
372					95% Hall's Bootstrap UCL	133	95% Percentile Bootstrap UCL	66.89				
373					95% BCA Bootstrap UCL	77.39						
374					90% Chebyshev(Mean, Sd) UCL	78.69	95% Chebyshev(Mean, Sd) UCL	92.09				
375					97.5% Chebyshev(Mean, Sd) UCL	110.7	99% Chebyshev(Mean, Sd) UCL	147.3				
376												
377	**Suggested UCL to Use**											
378					95% Chebyshev (Mean, Sd) UCL	92.09						
379												
380	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
381	Recommendations are based upon data size, data distribution, and skewness.											
382	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
383	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
384												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 12:28:02 PM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

F1

General Statistics

Total Number of Observations	154	Number of Distinct Observations	32
Number of Detects	35	Number of Non-Detects	119
Number of Distinct Detects	31	Number of Distinct Non-Detects	1
Minimum Detect	3.1	Minimum Non-Detect	2.5
Maximum Detect	620	Maximum Non-Detect	2.5
Variance Detects	13238	Percent Non-Detects	77.27%
Mean Detects	82.24	SD Detects	115.1
Median Detects	41	CV Detects	1.399
Skewness Detects	3.271	Kurtosis Detects	13.81
Mean of Logged Detects	3.604	SD of Logged Detects	1.401

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.657	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.148	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	20.62	KM Standard Error of Mean	5.196
KM SD	63.56	95% KM (BCA) UCL	31.23
95% KM (t) UCL	29.22	95% KM (Percentile Bootstrap) UCL	29.97
95% KM (z) UCL	29.17	95% KM Bootstrap t UCL	34.45
90% KM Chebyshev UCL	36.21	95% KM Chebyshev UCL	43.27
97.5% KM Chebyshev UCL	53.07	99% KM Chebyshev UCL	72.32

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.381	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.788	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0893	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.155	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.744	k star (bias corrected MLE)	0.699
Theta hat (MLE)	110.5	Theta star (bias corrected MLE)	117.6
nu hat (MLE)	52.09	nu star (bias corrected)	48.96
Mean (detects)	82.24		

51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	18.7	
59					Maximum	620				Median	0.01	
60					SD	64.32				CV	3.44	
61					k hat (MLE)	0.137				k star (bias corrected MLE)	0.139	
62					Theta hat (MLE)	136.2				Theta star (bias corrected MLE)	134.5	
63					nu hat (MLE)	42.3				nu star (bias corrected)	42.81	
64					Adjusted Level of Significance (β)	0.0484						
65					Approximate Chi Square Value (42.81, α)	28.81				Adjusted Chi Square Value (42.81, β)	28.7	
66					95% Gamma Approximate UCL (use when n>=50)	27.79				95% Gamma Adjusted UCL (use when n<50)	27.89	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	20.62				SD (KM)	63.56	
70					Variance (KM)	4039				SE of Mean (KM)	5.196	
71					k hat (KM)	0.105				k star (KM)	0.108	
72					nu hat (KM)	32.43				nu star (KM)	33.13	
73					theta hat (KM)	195.9				theta star (KM)	191.7	
74					80% gamma percentile (KM)	15.83				90% gamma percentile (KM)	56.45	
75					95% gamma percentile (KM)	119.1				99% gamma percentile (KM)	315.8	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (33.13, α)	20.97				Adjusted Chi Square Value (33.13, β)	20.88	
79					95% Gamma Approximate KM-UCL (use when n>=50)	32.58				95% Gamma Adjusted KM-UCL (use when n<50)	32.72	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.959				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk Critical Value	0.934				Detected Data appear Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.115				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.148				Detected Data appear Lognormal at 5% Significance Level		
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	19.47				Mean in Log Scale	-0.305	
90					SD in Original Scale	64.11				SD in Log Scale	2.932	
91					95% t UCL (assumes normality of ROS data)	28.02				95% Percentile Bootstrap UCL	28.51	
92					95% BCA Bootstrap UCL	31.29				95% Bootstrap t UCL	33.48	
93					95% H-UCL (Log ROS)	157.3						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	1.527				KM Geo Mean	4.605	
97					KM SD (logged)	1.305				95% Critical H Value (KM-Log)	2.506	
98					KM Standard Error of Mean (logged)	0.107				95% H-UCL (KM -Log)	14.05	
99					KM SD (logged)	1.305				95% Critical H Value (KM-Log)	2.506	
100					KM Standard Error of Mean (logged)	0.107						

101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	19.66				Mean in Log Scale	0.992	
105					SD in Original Scale	64.04				SD in Log Scale	1.568	
106					95% t UCL (Assumes normality)	28.2				95% H-Stat UCL	13.12	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					95% KM Approximate Gamma UCL	32.58						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												
120	**F2**											
121												
122	**General Statistics**											
123					Total Number of Observations	154				Number of Distinct Observations	46	
124					Number of Detects	50				Number of Non-Detects	104	
125					Number of Distinct Detects	45				Number of Distinct Non-Detects	1	
126					Minimum Detect	5				Minimum Non-Detect	10	
127					Maximum Detect	32000				Maximum Non-Detect	10	
128					Variance Detects	21545519				Percent Non-Detects	67.53%	
129					Mean Detects	2201				SD Detects	4642	
130					Median Detects	1000				CV Detects	2.109	
131					Skewness Detects	5.622				Kurtosis Detects	36.05	
132					Mean of Logged Detects	6.155				SD of Logged Detects	2.219	
133												
134	**Normal GOF Test on Detects Only**											
135					Shapiro Wilk Test Statistic	0.44	**Shapiro Wilk GOF Test**					
136					5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level					
137					Lilliefors Test Statistic	0.318	**Lilliefors GOF Test**					
138					5% Lilliefors Critical Value	0.125	Detected Data Not Normal at 5% Significance Level					
139	**Detected Data Not Normal at 5% Significance Level**											
140												
141	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
142					KM Mean	717.8				KM Standard Error of Mean	229	
143					KM SD	2813				95% KM (BCA) UCL	1143	
144					95% KM (t) UCL	1097				95% KM (Percentile Bootstrap) UCL	1130	
145					95% KM (z) UCL	1094				95% KM Bootstrap t UCL	1548	
146					90% KM Chebyshev UCL	1405				95% KM Chebyshev UCL	1716	
147					97.5% KM Chebyshev UCL	2148				99% KM Chebyshev UCL	2996	
148												
149	**Gamma GOF Tests on Detected Observations Only**											
150					A-D Test Statistic	0.967	**Anderson-Darling GOF Test**					

151				5% A-D Critical Value		0.833	Detected Data Not Gamma Distributed at 5% Significance Level					
152				K-S Test Statistic		0.133	**Kolmogorov-Smirnov GOF**					
153				5% K-S Critical Value		0.134	Detected data appear Gamma Distributed at 5% Significance Level					
154	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
155												
156	**Gamma Statistics on Detected Data Only**											
157				k hat (MLE)		0.423	k star (bias corrected MLE)					0.411
158				Theta hat (MLE)		5201	Theta star (bias corrected MLE)					5354
159				nu hat (MLE)		42.31	nu star (bias corrected)					41.1
160				Mean (detects)		2201						
161												
162	**Gamma ROS Statistics using Imputed Non-Detects**											
163	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
164	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
165	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
166	This is especially true when the sample size is small.											
167	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
168				Minimum		0.01	Mean					714.5
169				Maximum		32000	Median					0.01
170				SD		2823	CV					3.951
171				k hat (MLE)		0.105	k star (bias corrected MLE)					0.107
172				Theta hat (MLE)		6802	Theta star (bias corrected MLE)					6657
173				nu hat (MLE)		32.35	nu star (bias corrected)					33.06
174				Adjusted Level of Significance (β)		0.0484						
175				Approximate Chi Square Value (33.06, α)		20.91	Adjusted Chi Square Value (33.06, β)					20.82
176				95% Gamma Approximate UCL (use when n>=50)		1129	95% Gamma Adjusted UCL (use when n<50)					1134
177												
178	**Estimates of Gamma Parameters using KM Estimates**											
179				Mean (KM)		717.8	SD (KM)					2813
180				Variance (KM)		7912338	SE of Mean (KM)					229
181				k hat (KM)		0.0651	k star (KM)					0.0682
182				nu hat (KM)		20.06	nu star (KM)					21
183				theta hat (KM)		11022	theta star (KM)					10528
184				80% gamma percentile (KM)		241.7	90% gamma percentile (KM)					1517
185				95% gamma percentile (KM)		4115	99% gamma percentile (KM)					13689
186												
187	**Gamma Kaplan-Meier (KM) Statistics**											
188				Approximate Chi Square Value (21.00, α)		11.59	Adjusted Chi Square Value (21.00, β)					11.53
189				95% Gamma Approximate KM-UCL (use when n>=50)		1300	95% Gamma Adjusted KM-UCL (use when n<50)					1308
190												
191	**Lognormal GOF Test on Detected Observations Only**											
192				Shapiro Wilk Test Statistic		0.904	**Shapiro Wilk GOF Test**					
193				5% Shapiro Wilk Critical Value		0.947	Detected Data Not Lognormal at 5% Significance Level					
194				Lilliefors Test Statistic		0.149	**Lilliefors GOF Test**					
195				5% Lilliefors Critical Value		0.125	Detected Data Not Lognormal at 5% Significance Level					
196	**Detected Data Not Lognormal at 5% Significance Level**											
197												
198	**Lognormal ROS Statistics Using Imputed Non-Detects**											
199				Mean in Original Scale		719.2	Mean in Log Scale					2.11
200				SD in Original Scale		2822	SD in Log Scale					3.713

201	95% t UCL (assumes normality of ROS data)					1095	95% Percentile Bootstrap UCL					1127
202	95% BCA Bootstrap UCL					1361	95% Bootstrap t UCL					1533
203	95% H-UCL (Log ROS)					42832						
204												
205	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
206	KM Mean (logged)					3.085	KM Geo Mean					21.87
207	KM SD (logged)					2.469	95% Critical H Value (KM-Log)					3.887
208	KM Standard Error of Mean (logged)					0.201	95% H-UCL (KM -Log)					1002
209	KM SD (logged)					2.469	95% Critical H Value (KM-Log)					3.887
210	KM Standard Error of Mean (logged)					0.201						
211												
212	**DL/2 Statistics**											
213	**DL/2 Normal**						**DL/2 Log-Transformed**					
214	Mean in Original Scale					717.8	Mean in Log Scale					3.085
215	SD in Original Scale					2822	SD in Log Scale					2.477
216	95% t UCL (Assumes normality)					1094	95% H-Stat UCL					1027
217	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
218												
219	**Nonparametric Distribution Free UCL Statistics**											
220	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
221												
222	**Suggested UCL to Use**											
223	95% KM Approximate Gamma UCL					1300						
224												
225	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
226	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
227												
228	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
229	Recommendations are based upon data size, data distribution, and skewness.											
230	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
231	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
232												
233	**F3**											
234												
235	**General Statistics**											
236	Total Number of Observations					154	Number of Distinct Observations					54
237	Number of Detects					67	Number of Non-Detects					87
238	Number of Distinct Detects					53	Number of Distinct Non-Detects					1
239	Minimum Detect					17	Minimum Non-Detect					25
240	Maximum Detect					4600	Maximum Non-Detect					25
241	Variance Detects					722208	Percent Non-Detects					56.49%
242	Mean Detects					470	SD Detects					849.8
243	Median Detects					130	CV Detects					1.808
244	Skewness Detects					3.047	Kurtosis Detects					10.07
245	Mean of Logged Detects					5.035	SD of Logged Detects					1.489
246												
247	**Normal GOF Test on Detects Only**											
248	Shapiro Wilk Test Statistic					0.575	**Normal GOF Test on Detected Observations Only**					
249	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
250	Lilliefors Test Statistic					0.297	**Lilliefors GOF Test**					

251	5% Lilliefors Critical Value					0.108	Detected Data Not Normal at 5% Significance Level					
252	**Detected Data Not Normal at 5% Significance Level**											
253												
254	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
255	KM Mean					216.5	KM Standard Error of Mean					48.65
256	KM SD					599.2	95% KM (BCA) UCL					294.2
257	95% KM (t) UCL					297	95% KM (Percentile Bootstrap) UCL					301.8
258	95% KM (z) UCL					296.5	95% KM Bootstrap t UCL					331.3
259	90% KM Chebyshev UCL					362.5	95% KM Chebyshev UCL					428.6
260	97.5% KM Chebyshev UCL					520.3	99% KM Chebyshev UCL					700.6
261												
262	**Gamma GOF Tests on Detected Observations Only**											
263	A-D Test Statistic					2.766	**Anderson-Darling GOF Test**					
264	5% A-D Critical Value					0.811	Detected Data Not Gamma Distributed at 5% Significance Level					
265	K-S Test Statistic					0.163	**Kolmogorov-Smirnov GOF**					
266	5% K-S Critical Value					0.115	Detected Data Not Gamma Distributed at 5% Significance Level					
267	**Detected Data Not Gamma Distributed at 5% Significance Level**											
268												
269	**Gamma Statistics on Detected Data Only**											
270	k hat (MLE)					0.559	k star (bias corrected MLE)					0.544
271	Theta hat (MLE)					841.2	Theta star (bias corrected MLE)					864.5
272	nu hat (MLE)					74.87	nu star (bias corrected)					72.85
273	Mean (detects)					470						
274												
275	**Gamma ROS Statistics using Imputed Non-Detects**											
276	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
277	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
278	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
279	This is especially true when the sample size is small.											
280	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
281	Minimum					0.01	Mean					204.5
282	Maximum					4600	Median					0.01
283	SD					605.1	CV					2.959
284	k hat (MLE)					0.136	k star (bias corrected MLE)					0.138
285	Theta hat (MLE)					1504	Theta star (bias corrected MLE)					1485
286	nu hat (MLE)					41.89	nu star (bias corrected)					42.4
287	Adjusted Level of Significance (β)					0.0484						
288	Approximate Chi Square Value (42.40, α)					28.47	Adjusted Chi Square Value (42.40, β)					28.37
289	95% Gamma Approximate UCL (use when n>=50)					304.5	95% Gamma Adjusted UCL (use when n<50)					305.7
290												
291	**Estimates of Gamma Parameters using KM Estimates**											
292	Mean (KM)					216.5	SD (KM)					599.2
293	Variance (KM)					358994	SE of Mean (KM)					48.65
294	k hat (KM)					0.131	k star (KM)					0.132
295	nu hat (KM)					40.22	nu star (KM)					40.77
296	theta hat (KM)					1658	theta star (KM)					1636
297	80% gamma percentile (KM)					210.6	90% gamma percentile (KM)					628.3
298	95% gamma percentile (KM)					1218	99% gamma percentile (KM)					2978
299												
300	**Gamma Kaplan-Meier (KM) Statistics**											

301	Approximate Chi Square Value (40.77, α)					27.14	Adjusted Chi Square Value (40.77, β)					27.04
302	95% Gamma Approximate KM-UCL (use when n>=50)					325.3	95% Gamma Adjusted KM-UCL (use when n<50)					326.6
303												
304	**Lognormal GOF Test on Detected Observations Only**											
305	Shapiro Wilk Approximate Test Statistic					0.941	**Shapiro Wilk GOF Test**					
306	5% Shapiro Wilk P Value					0.00548	Detected Data Not Lognormal at 5% Significance Level					
307	Lilliefors Test Statistic					0.0912	**Lilliefors GOF Test**					
308	5% Lilliefors Critical Value					0.108	Detected Data appear Lognormal at 5% Significance Level					
309	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
310												
311	**Lognormal ROS Statistics Using Imputed Non-Detects**											
312	Mean in Original Scale					215.6	Mean in Log Scale					3.583
313	SD in Original Scale					601.6	SD in Log Scale					1.838
314	95% t UCL (assumes normality of ROS data)					295.8	95% Percentile Bootstrap UCL					301.8
315	95% BCA Bootstrap UCL					323.9	95% Bootstrap t UCL					333.7
316	95% H-UCL (Log ROS)					309						
317												
318	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
319	KM Mean (logged)					3.915	KM Geo Mean					50.17
320	KM SD (logged)					1.387	95% Critical H Value (KM-Log)					2.593
321	KM Standard Error of Mean (logged)					0.115	95% H-UCL (KM -Log)					175.6
322	KM SD (logged)					1.387	95% Critical H Value (KM-Log)					2.593
323	KM Standard Error of Mean (logged)					0.115						
324												
325	**DL/2 Statistics**											
326	**DL/2 Normal**						**DL/2 Log-Transformed**					
327	Mean in Original Scale					211.5	Mean in Log Scale					3.617
328	SD in Original Scale					602.8	SD in Log Scale					1.586
329	95% t UCL (Assumes normality)					291.9	95% H-Stat UCL					187.8
330	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
331												
332	**Nonparametric Distribution Free UCL Statistics**											
333	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
334												
335	**Suggested UCL to Use**											
336	KM H-UCL					175.6						
337												
338	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
339	Recommendations are based upon data size, data distribution, and skewness.											
340	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
341	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
342												

ERA Intake Parameters

Lower Site

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Meadow Vole		
Receptor Name	Meadow Vole	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	2	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	0	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.042	kg
Food intake rate	1.1E-02	kg wet-wt/day
Water intake rate	6.0E-03	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	4.8E-01	
Fraction of food intake rate	6.0E-02	
Ingestion rate	3.1E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	7.5E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	9.8E-01	
Ingestion rate	1.1E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	2.6E-01	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	2.0E-02	
Ingestion rate	2.2E-04	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	5.2E-03	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	6.0E-03	L/day
Fraction from site	1	
Intake factor (IFing-sw)	1.4E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Masked Shrew		
Receptor Name	Masked Shrew	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	2	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	0	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.005	kg
Food intake rate	3.0E-03	kg wet-wt/day
Water intake rate	1.0E-03	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	3.0E-01	
Fraction of food intake rate	4.9E-02	
Ingestion rate	4.4E-05	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	8.9E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	2.5E-02	
Ingestion rate	7.5E-05	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	1.5E-02	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	9.8E-01	
Ingestion rate	2.9E-03	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	5.9E-01	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	1.0E-03	L/day
Fraction from site	1	
Intake factor (IFing-sw)	2.0E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Mink		
Receptor Name	Mink	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	2	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	0	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.85	kg
Food intake rate	2.2E-01	kg wet-wt/day
Water intake rate	9.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	2.8E-01	
Fraction of food intake rate	5.8E-03	
Ingestion rate	3.6E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	4.2E-04	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	5.5E-01	
Ingestion rate	1.2E-01	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	1.4E-01	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	9.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	1.1E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	2.8E-01	
Fraction of food intake rate	1.3E-02	
Ingestion rate	7.8E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	9.1E-04	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	1.0E-01	
Ingestion rate	2.2E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	2.6E-02	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	3.5E-01	
Ingestion rate	7.7E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Red-tailed Hawk		
Receptor Name	Red-tailed Hawk	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	1	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	1	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	1.1	kg
Food intake rate	1.9E-01	kg wet-wt/day
Water intake rate	6.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	3.3E-01	
Fraction of food intake rate	1.1E-02	
Ingestion rate	6.6E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	6.0E-04	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	1.0E+00	
Ingestion rate	1.9E-01	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	1.7E-01	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	6.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	5.5E-02	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Common Merganser

Receptor Name	Common Merganser	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	1	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	1	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	1.5	kg
Food intake rate	3.0E-01	kg wet-wt/day
Water intake rate	8.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	8.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	5.3E-02	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	2.9E-01	
Fraction of food intake rate	1.0E-02	
Ingestion rate	8.6E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	5.7E-04	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	1.0E+00	
Ingestion rate	3.0E-01	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the American Robin		
Receptor Name	American Robin	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	1	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	1	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.08	kg
Food intake rate	6.5E-02	kg wet-wt/day
Water intake rate	1.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	2.6E-01	
Fraction of food intake rate	2.9E-02	
Ingestion rate	4.8E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	6.1E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	5.2E-01	
Ingestion rate	3.4E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	4.2E-01	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	4.8E-01	
Ingestion rate	3.1E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	3.9E-01	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	1.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	1.3E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

ERA Results

Lower Site

Exposure Point Concentrations for Border Beacon

Constituent	CAS-RN	Soil Conc. (mg/kg dw)	Terrestrial Plant Conc. (mg/kg ww)	Terrestrial Invertebrate Conc. (mg/kg ww)	Terrestrial Mammal Conc. (mg/kg ww)	Surface Water Conc. (mg/L)	Freshwater Sediment Conc. (mg/kg dw)	Freshwater Aquatic Plant Conc. (mg/kg ww)	Freshwater Benthic Invertebrate Conc. (mg/kg ww)	Freshwater Fish Tissue Conc. (mg/kg ww)
TPH - CCME CWS	% Composition									
Aliph>C06-C08 - F1	0.55	1.8E+01	2.7E+00	1.8E+00	7.3E-02	2.8E-03	6.9E-01	5.0E-01	1.4E-03	1.3E-01
Aliph>C08-C10 - F1	0.36	1.2E+01	2.2E-01	1.2E+00	1.2E-02	1.8E-03	4.5E-01	2.6E+00	8.5E-04	7.0E-01
Arom>C08-C10 - F1	0.09	3.0E+00	9.0E-01	3.0E-01	1.8E-02	4.5E-04	1.1E-01	3.2E-02	2.4E-04	8.7E-03
F1 - Total	1	3.3E+01	3.8E+00	3.2E+00	1.0E-01	5.0E-03	1.3E+00	3.1E+00	2.5E-03	8.4E-01
Aliph>C10-C12 - F2	0.36	4.7E+02	5.7E-01	2.9E+01	7.3E-02	9.0E-03	1.8E+00	1.0E+02	3.1E-03	2.8E+01
Aliph>C12-C16 - F2	0.44	5.7E+02	5.0E-02	2.8E+01	4.8E-02	1.1E-02	2.2E+00	2.5E+03	3.4E-03	6.7E+02
Arom>C10-C12 - F2	0.09	1.2E+02	2.5E+01	7.2E+00	2.9E-01	2.3E-03	4.5E-01	2.6E-01	9.3E-04	6.9E-02
Arom>C12-C16 - F2	0.11	1.4E+02	1.7E+01	8.8E+00	2.5E-01	2.8E-03	5.5E-01	6.3E-01	1.1E-03	1.7E-01
F2 - Total	1	1.3E+03	4.3E+01	7.2E+01	6.7E-01	2.5E-02	5.0E+00	2.6E+03	8.6E-03	7.0E+02
Aliph>C16-C21 - F3	0.56	9.9E+01	8.7E-03	4.8E+00	8.3E-03	5.5E-01	4.6E+01	1.6E+07	1.2E-01	---
Aliph>C21-C34 - F3	0.24	4.2E+01	3.7E-03	1.0E+00	1.8E-03	2.4E-01	2.0E+01	6.8E+06	5.1E-02	---
Arom>C16-C21 - F3	0.14	2.5E+01	9.8E-01	1.2E+00	1.6E-02	1.4E-01	1.2E+01	9.9E+01	4.5E-02	2.7E+01
Arom>C21-C34 - F3	0.06	1.1E+01	3.4E-02	5.2E-01	1.7E-03	5.9E-02	5.0E+00	3.4E+02	1.8E-02	9.0E+01
F3 - Total	1	1.8E+02	1.0E+00	7.6E+00	2.8E-02	9.8E-01	8.3E+01	2.3E+07	2.3E-01	1.2E+02
Polycyclic Aromatic Hydrocarbons										
Low Molecular Weight PAHs										
Acenaphthene	83329	2.6E-01	2.2E-02	8.5E-03	1.2E-03	5.0E-06	1.4E-02	1.1E-03	5.7E-05	2.0E-04
Acenaphthylene	208968	8.0E-02	1.3E-02	2.6E-03	7.0E-04	5.0E-06	5.0E-03	1.4E-03	2.0E-05	2.5E-04
Anthracene	120127	2.0E-02	6.8E-03	6.5E-04	4.7E-04	5.0E-06	5.0E-03	4.4E-03	1.9E-05	7.9E-04
Fluoranthene	206440	2.5E-02	7.5E-03	8.1E-04	6.1E-04	5.0E-06	5.0E-03	1.4E-02	1.9E-05	2.5E-03
Fluorene	86737	1.5E-01	1.7E-02	4.9E-03	1.1E-03	5.0E-06	5.0E-03	2.2E-03	2.0E-05	4.0E-04
1-Methylnaphthalene	90120	1.1E+00	4.2E-02	3.6E-02	2.4E-03	5.0E-06	2.1E-02	1.0E-03	8.6E-05	1.9E-04
2-Methylnaphthalene	91576	1.5E+00	4.8E-02	4.9E-02	2.8E-03	5.0E-06	2.4E-02	1.0E-03	9.9E-05	1.8E-04
Naphthalene	91203	3.8E-01	2.6E-02	1.3E-02	8.5E-04	5.0E-06	5.0E-03	2.8E-04	2.2E-05	5.0E-05
Phenanthrene	85018	5.5E-01	3.1E-02	1.8E-02	2.3E-03	5.0E-06	5.0E-03	4.4E-03	1.9E-05	7.9E-04
High Molecular Weight PAHs										
Benz(a)anthracene	56553	5.0E-03	1.8E-04	8.1E-05	1.7E-05	5.0E-06	5.0E-03	7.0E-02	1.8E-05	1.3E-02
Benzo(a)pyrene	50328	5.0E-03	1.8E-04	4.1E-04	8.1E-05	5.0E-06	5.0E-03	1.4E-01	8.5E-05	2.5E-02
Benzo(b)fluoranthene	205992	5.0E-03	1.8E-04	8.1E-05	1.6E-05	5.0E-06	5.0E-03	1.9E-01	1.7E-05	3.3E-02
Benzo(g,h,i)perylene	191242	5.0E-03	1.8E-04	4.1E-04	6.7E-05	5.0E-06	5.0E-03	4.4E-01	8.2E-05	7.9E-02
Benzo(j)fluoranthene	205823	5.0E-03	1.8E-04	4.1E-04	7.0E-05	5.0E-06	5.0E-03	3.7E-01	8.2E-05	6.6E-02
Benzo(k)fluoranthene	207089	5.0E-03	1.8E-04	8.1E-05	1.6E-05	5.0E-06	5.0E-03	1.8E-01	1.7E-05	3.2E-02
Chrysene	218019	1.2E-02	4.1E-04	1.9E-04	4.0E-05	5.0E-06	5.0E-03	7.0E-02	1.8E-05	1.3E-02
Dibenz(a,h)anthracene	53703	5.0E-03	1.8E-04	4.1E-04	6.7E-05	5.0E-06	5.0E-03	4.4E-01	8.2E-05	7.9E-02
Indeno(1,2,3-cd)pyrene	193395	5.0E-03	1.8E-04	4.1E-04	6.7E-05	5.0E-06	5.0E-03	5.6E-01	8.1E-05	1.0E-01
Perylene	198550	5.0E-03	1.8E-04	4.1E-04	7.5E-05	5.0E-06	5.0E-03	2.5E-01	8.4E-05	4.5E-02
Pyrene	129000	2.8E-02	9.3E-04	4.5E-04	8.6E-05	5.0E-06	5.0E-03	1.1E-02	1.9E-05	2.0E-03
Inorganics										

Detailed Baseline Case Hazard Quotients for the Meadow Vole Exposed to CoPCs at Border Beacon Receptor Location

Detailed Baseline Case Hazard Quotients for the Meadow Vole Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS											
Aliph>C06-C08 - F1	5.0E+01	1.4E-01	2.7E-03	6.9E-01	1.4E-02	9.4E-03	1.9E-04	3.9E-04	7.9E-06	---	1.7E-02
Aliph>C08-C10 - F1	5.0E+01	8.9E-02	1.8E-03	5.7E-02	1.1E-03	6.1E-03	1.2E-04	2.6E-04	5.1E-06	---	3.0E-03
Arom>C08-C10 - F1	1.0E+02	2.2E-02	2.2E-04	2.3E-01	2.3E-03	1.6E-03	1.6E-05	6.4E-05	6.4E-07	---	2.6E-03
F1 - Total											2.2E-02
Aliph>C10-C12 - F2	2.5E+02	3.5E+00	1.4E-02	1.5E-01	5.9E-04	1.5E-01	6.0E-04	1.3E-03	5.1E-06	---	1.5E-02
Aliph>C12-C16 - F2	2.5E+02	4.3E+00	1.7E-02	1.3E-02	5.2E-05	1.5E-01	5.8E-04	1.6E-03	6.3E-06	---	1.8E-02
Arom>C10-C12 - F2	5.0E+01	8.8E-01	1.8E-02	6.5E+00	1.3E-01	3.8E-02	7.6E-04	3.2E-04	6.4E-06	---	1.5E-01
Arom>C12-C16 - F2	5.0E+01	1.1E+00	2.1E-02	4.5E+00	8.9E-02	4.6E-02	9.2E-04	3.9E-04	7.9E-06	---	1.1E-01
F2 - Total											2.9E-01
Aliph>C16-C21 - F3	1.0E+03	7.4E-01	7.4E-04	2.2E-03	2.2E-06	2.5E-02	2.5E-05	7.8E-02	7.8E-05	---	8.4E-04
Aliph>C21-C34 - F3	1.0E+03	3.2E-01	3.2E-04	9.5E-04	9.5E-07	5.4E-03	5.4E-06	3.4E-02	3.4E-05	---	3.6E-04
Arom>C16-C21 - F3	5.0E+01	1.8E-01	3.7E-03	2.5E-01	5.1E-03	6.3E-03	1.3E-04	2.0E-02	3.9E-04	---	9.3E-03
Arom>C21-C34 - F3	5.0E+01	7.9E-02	1.6E-03	8.8E-03	1.8E-04	2.7E-03	5.4E-05	8.4E-03	1.7E-04	---	2.0E-03
F3 - Total											1.2E-02
										Total TPH HQ =	3.3E-01
Polycyclic Aromatic Hydrocarbons											
Low Molecular Weight PAHs											
Acenaphthene	1.7E+02	1.9E-03	1.1E-05	5.6E-03	3.3E-05	4.5E-05	2.6E-07	7.1E-07	4.2E-09	---	4.5E-05
Acenaphthylene	1.7E+02	6.0E-04	3.5E-06	3.3E-03	1.9E-05	1.4E-05	8.1E-08	7.1E-07	4.2E-09	---	2.3E-05
Anthracene	1.7E+02	1.5E-04	8.8E-07	1.7E-03	1.0E-05	3.4E-06	2.0E-08	7.1E-07	4.2E-09	---	1.1E-05
Fluoranthene	1.7E+02	1.9E-04	1.1E-06	1.9E-03	1.1E-05	4.3E-06	2.5E-08	7.1E-07	4.2E-09	---	1.2E-05
Fluorene	1.7E+02	1.1E-03	6.6E-06	4.3E-03	2.6E-05	2.6E-05	1.5E-07	7.1E-07	4.2E-09	---	3.2E-05
1-Methylnaphthalene	1.7E+02	8.2E-03	4.8E-05	1.1E-02	6.3E-05	1.9E-04	1.1E-06	7.1E-07	4.2E-09	---	1.1E-04
2-Methylnaphthalene	1.7E+02	1.1E-02	6.6E-05	1.2E-02	7.3E-05	2.6E-04	1.5E-06	7.1E-07	4.2E-09	---	1.4E-04
Naphthalene	1.7E+02	2.8E-03	1.7E-05	6.6E-03	3.9E-05	6.7E-05	4.0E-07	7.1E-07	4.2E-09	---	5.6E-05
Phenanthrene	1.7E+02	4.1E-03	2.4E-05	7.8E-03	4.6E-05	9.4E-05	5.5E-07	7.1E-07	4.2E-09	---	7.1E-05
										TOTAL LPAH HQ =	5.0E-04
High Molecular Weight PAHs											
Benz(a)anthracene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	4.2E-07	2.4E-08	7.1E-07	4.0E-08	---	4.7E-06
Benzo(a)pyrene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Benzo(b)fluoranthene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	4.2E-07	2.4E-08	7.1E-07	4.0E-08	---	4.7E-06
Benzo(g,h,i)perylene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Benzo(j)fluoranthene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Benzo(k)fluoranthene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	4.2E-07	2.4E-08	7.1E-07	4.0E-08	---	4.7E-06
Chrysene	1.8E+01	9.0E-05	5.0E-06	1.1E-04	5.9E-06	1.0E-06	5.7E-08	7.1E-07	4.0E-08	---	1.1E-05
Dibenz(a,h)anthracene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Indeno(1,2,3-cd)pyrene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Perylene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	7.1E-07	4.0E-08	---	4.8E-06
Pyrene	1.8E+01	2.1E-04	1.2E-05	2.4E-04	1.3E-05	2.4E-06	1.3E-07	7.1E-07	4.0E-08	---	2.5E-05
										TOTAL HPAH HQ =	7.9E-05
										TOTAL PAH HQ =	5.8E-04
Inorganics											

Detailed Baseline Case Hazard Quotients for the Masked Shrew Exposed to CoPCs at Border Beacon Receptor Location

Detailed Baseline Case Hazard Quotients for the Masked Shrew Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS											
Aliph>C06-C08 - F1	5.0E+01	1.6E-01	3.2E-03	4.0E-02	8.1E-04	1.0E+00	2.1E-02	5.5E-04	1.1E-05	---	2.5E-02
Aliph>C08-C10 - F1	5.0E+01	1.1E-01	2.1E-03	3.3E-03	6.6E-05	6.8E-01	1.4E-02	3.6E-04	7.2E-06	---	1.6E-02
Arom>C08-C10 - F1	1.0E+02	2.6E-02	2.6E-04	1.4E-02	1.4E-04	1.7E-01	1.7E-03	9.0E-05	9.0E-07	---	2.1E-03
F1 - Total											4.3E-02
Aliph>C10-C12 - F2	2.5E+02	4.2E+00	1.7E-02	8.6E-03	3.4E-05	1.7E+01	6.7E-02	1.8E-03	7.2E-06	---	8.3E-02
Aliph>C12-C16 - F2	2.5E+02	5.1E+00	2.0E-02	7.5E-04	3.0E-06	1.6E+01	6.5E-02	2.2E-03	8.8E-06	---	8.6E-02
Arom>C10-C12 - F2	5.0E+01	1.0E+00	2.1E-02	3.8E-01	7.5E-03	4.2E+00	8.5E-02	4.5E-04	9.0E-06	---	1.1E-01
Arom>C12-C16 - F2	5.0E+01	1.3E+00	2.5E-02	2.6E-01	5.2E-03	5.1E+00	1.0E-01	5.5E-04	1.1E-05	---	1.3E-01
F2 - Total											4.2E-01
Aliph>C16-C21 - F3	1.0E+03	8.7E-01	8.7E-04	1.3E-04	1.3E-07	2.8E+00	2.8E-03	1.1E-01	1.1E-04	---	3.8E-03
Aliph>C21-C34 - F3	1.0E+03	3.7E-01	3.7E-04	5.6E-05	5.6E-08	6.0E-01	6.0E-04	4.7E-02	4.7E-05	---	1.0E-03
Arom>C16-C21 - F3	5.0E+01	2.2E-01	4.4E-03	1.5E-02	3.0E-04	7.0E-01	1.4E-02	2.7E-02	5.5E-04	---	1.9E-02
Arom>C21-C34 - F3	5.0E+01	9.4E-02	1.9E-03	5.2E-04	1.0E-05	3.0E-01	6.0E-03	1.2E-02	2.4E-04	---	8.1E-03
F3 - Total											3.2E-02
										Total TPH HQ =	4.9E-01
Polycyclic Aromatic Hydrocarbons											
Low Molecular Weight PAHs											
Acenaphthene	1.7E+02	2.3E-03	1.4E-05	3.3E-04	1.9E-06	5.0E-03	2.9E-05	1.0E-06	5.9E-09	---	4.5E-05
Acenaphthylene	1.7E+02	7.1E-04	4.2E-06	1.9E-04	1.1E-06	1.5E-03	9.0E-06	1.0E-06	5.9E-09	---	1.4E-05
Anthracene	1.7E+02	1.8E-04	1.0E-06	1.0E-04	6.0E-07	3.8E-04	2.2E-06	1.0E-06	5.9E-09	---	3.9E-06
Fluoranthene	1.7E+02	2.2E-04	1.3E-06	1.1E-04	6.6E-07	4.7E-04	2.8E-06	1.0E-06	5.9E-09	---	4.8E-06
Fluorene	1.7E+02	1.3E-03	7.8E-06	2.5E-04	1.5E-06	2.9E-03	1.7E-05	1.0E-06	5.9E-09	---	2.6E-05
1-Methylnaphthalene	1.7E+02	9.8E-03	5.7E-05	6.3E-04	3.7E-06	2.1E-02	1.2E-04	1.0E-06	5.9E-09	---	1.9E-04
2-Methylnaphthalene	1.7E+02	1.3E-02	7.8E-05	7.2E-04	4.2E-06	2.9E-02	1.7E-04	1.0E-06	5.9E-09	---	2.5E-04
Naphthalene	1.7E+02	3.4E-03	2.0E-05	3.9E-04	2.3E-06	7.5E-03	4.4E-05	1.0E-06	5.9E-09	---	6.6E-05
Phenanthrene	1.7E+02	4.9E-03	2.9E-05	4.6E-04	2.7E-06	1.0E-02	6.2E-05	1.0E-06	5.9E-09	---	9.3E-05
										TOTAL LPAH HQ =	6.9E-04
High Molecular Weight PAHs											
Benz(a)anthracene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	4.7E-05	2.6E-06	1.0E-06	5.6E-08	---	5.3E-06
Benzo(a)pyrene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Benzo(b)fluoranthene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	4.7E-05	2.6E-06	1.0E-06	5.6E-08	---	5.3E-06
Benzo(g,h,i)perylene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Benzo(j)fluoranthene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Benzo(k)fluoranthene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	4.7E-05	2.6E-06	1.0E-06	5.6E-08	---	5.3E-06
Chrysene	1.8E+01	1.1E-04	5.9E-06	6.2E-06	3.5E-07	1.1E-04	6.3E-06	1.0E-06	5.6E-08	---	1.3E-05
Dibenz(a,h)anthracene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Indeno(1,2,3-cd)pyrene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Perylene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.0E-06	5.6E-08	---	1.6E-05
Pyrene	1.8E+01	2.5E-04	1.4E-05	1.4E-05	7.7E-07	2.7E-04	1.5E-05	1.0E-06	5.6E-08	---	2.9E-05
										TOTAL HPAH HQ =	1.5E-04
										TOTAL PAH HQ =	8.4E-04
Inorganics											

Detailed Baseline Case Hazard Quotient Detailed Baseline Case Hazard Quotients for the Mink Exposed to CoPCs at Border Beacon Receptor Location

Detailed Baseline Case Hazard Quotients for the Mink Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Mammal Ingestion HQ	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Average Daily Dose (mg/kg-day)	Freshwater Sediment Ingestion HQ	Average Daily Dose (mg/kg-day)	Freshwater Benthic Invertebrate Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS													
Aliph>C06-C08 - F1	4.0E+01	7.6E-03	1.9E-04	1.0E-02	2.6E-04	2.9E-04	7.3E-06	6.3E-04	1.6E-05	3.6E-05	9.1E-07	---	4.7E-04
Aliph>C08-C10 - F1	4.0E+01	5.0E-03	1.2E-04	1.7E-03	4.1E-05	1.9E-04	4.8E-06	4.1E-04	1.0E-05	2.2E-05	5.5E-07	---	1.8E-04
Arom>C08-C10 - F1	8.0E+01	1.3E-03	1.6E-05	2.5E-03	3.2E-05	4.8E-05	5.9E-07	1.0E-04	1.3E-06	6.1E-06	7.7E-08	---	4.9E-05
F1 - Total													7.1E-04
Aliph>C10-C12 - F2	2.0E+02	2.0E-01	9.8E-04	1.0E-02	5.2E-05	9.5E-04	4.8E-06	1.6E-03	8.2E-06	8.1E-05	4.0E-07	---	1.0E-03
Aliph>C12-C16 - F2	2.0E+02	2.4E-01	1.2E-03	6.9E-03	3.4E-05	1.2E-03	5.8E-06	2.0E-03	1.0E-05	8.8E-05	4.4E-07	---	1.3E-03
Arom>C10-C12 - F2	4.0E+01	4.9E-02	1.2E-03	4.2E-02	1.0E-03	2.4E-04	5.9E-06	4.1E-04	1.0E-05	2.4E-05	6.0E-07	---	2.3E-03
Arom>C12-C16 - F2	4.0E+01	6.0E-02	1.5E-03	3.6E-02	9.0E-04	2.9E-04	7.3E-06	5.0E-04	1.3E-05	2.9E-05	7.2E-07	---	2.4E-03
F2 - Total													7.0E-03
Aliph>C16-C21 - F3	8.0E+02	4.1E-02	5.2E-05	1.2E-03	1.5E-06	5.8E-02	7.3E-05	4.2E-02	5.3E-05	3.1E-03	3.9E-06	---	1.8E-04
Aliph>C21-C34 - F3	8.0E+02	1.8E-02	2.2E-05	2.5E-04	3.2E-07	2.5E-02	3.1E-05	1.8E-02	2.3E-05	1.3E-03	1.7E-06	---	7.8E-05
Arom>C16-C21 - F3	4.0E+01	1.0E-02	2.6E-04	2.3E-03	5.8E-05	1.5E-02	3.6E-04	1.1E-02	2.7E-04	1.2E-03	2.9E-05	---	9.7E-04
Arom>C21-C34 - F3	4.0E+01	4.4E-03	1.1E-04	2.5E-04	6.1E-06	6.2E-03	1.6E-04	4.6E-03	1.1E-04	4.6E-04	1.1E-05	---	4.0E-04
F3 - Total													1.6E-03
												Total TPH HQ =	9.4E-03
Polycyclic Aromatic Hydrocarbons													
Low Molecular Weight PAHs													
Acenaphthene	1.7E+02	1.1E-04	6.4E-07	1.6E-04	9.7E-07	5.3E-07	3.1E-09	1.3E-05	7.5E-08	1.5E-06	8.8E-09	---	1.7E-06
Acenaphthylene	1.7E+02	3.4E-05	2.0E-07	9.9E-05	5.8E-07	5.3E-07	3.1E-09	4.6E-06	2.7E-08	5.3E-07	3.1E-09	---	8.1E-07
Anthracene	1.7E+02	8.4E-06	5.0E-08	6.7E-05	3.9E-07	5.3E-07	3.1E-09	4.6E-06	2.7E-08	5.0E-07	3.0E-09	---	4.8E-07
Fluoranthene	1.7E+02	1.1E-05	6.2E-08	8.6E-05	5.1E-07	5.3E-07	3.1E-09	4.6E-06	2.7E-08	4.8E-07	2.8E-09	---	6.0E-07
Fluorene	1.7E+02	6.3E-05	3.7E-07	1.5E-04	8.9E-07	5.3E-07	3.1E-09	4.6E-06	2.7E-08	5.2E-07	3.0E-09	---	1.3E-06
1-Methylnaphthalene	1.7E+02	4.6E-04	2.7E-06	3.4E-04	2.0E-06	5.3E-07	3.1E-09	1.9E-05	1.1E-07	2.2E-06	1.3E-08	---	4.8E-06
2-Methylnaphthalene	1.7E+02	6.3E-04	3.7E-06	4.0E-04	2.3E-06	5.3E-07	3.1E-09	2.2E-05	1.3E-07	2.6E-06	1.5E-08	---	6.2E-06
Naphthalene	1.7E+02	1.6E-04	9.4E-07	1.2E-04	7.1E-07	5.3E-07	3.1E-09	4.6E-06	2.7E-08	5.6E-07	3.3E-09	---	1.7E-06
Phenanthrene	1.7E+02	2.3E-04	1.4E-06	3.3E-04	2.0E-06	5.3E-07	3.1E-09	4.6E-06	2.7E-08	5.0E-07	3.0E-09	---	3.4E-06
												TOTAL LPAH HQ =	2.1E-05
High Molecular Weight PAHs													
Benz(a)anthracene	1.8E+01	2.1E-06	1.2E-07	2.5E-06	1.4E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	4.5E-07	2.5E-08	---	5.6E-07
Benzo(a)pyrene	1.8E+01	2.1E-06	1.2E-07	1.2E-05	6.4E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.2E-06	1.2E-07	---	1.2E-06
Benzo(b)fluoranthene	1.8E+01	2.1E-06	1.2E-07	2.2E-06	1.2E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	4.4E-07	2.4E-08	---	5.5E-07
Benzo(g,h,i)perylene	1.8E+01	2.1E-06	1.2E-07	9.6E-06	5.3E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.1E-06	1.2E-07	---	1.0E-06
Benzo(j)fluoranthene	1.8E+01	2.1E-06	1.2E-07	9.9E-06	5.5E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.1E-06	1.2E-07	---	1.1E-06
Benzo(k)fluoranthene	1.8E+01	2.1E-06	1.2E-07	2.2E-06	1.2E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	4.4E-07	2.4E-08	---	5.5E-07
Chrysene	1.8E+01	5.1E-06	2.8E-07	5.7E-06	3.2E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	4.5E-07	2.5E-08	---	9.0E-07
Dibenz(a,h)anthracene	1.8E+01	2.1E-06	1.2E-07	9.6E-06	5.3E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.1E-06	1.2E-07	---	1.0E-06
Indeno(1,2,3-cd)pyrene	1.8E+01	2.1E-06	1.2E-07	9.6E-06	5.3E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.1E-06	1.2E-07	---	1.0E-06
Perylene	1.8E+01	2.1E-06	1.2E-07	1.1E-05	5.9E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	2.2E-06	1.2E-07	---	1.1E-06
Pyrene	1.8E+01	1.2E-05	6.5E-07	1.2E-05	6.8E-07	5.3E-07	2.9E-08	4.6E-06	2.5E-07	4.9E-07	2.7E-08	---	1.6E-06
												TOTAL HPAH HQ =	1.3E-05
												TOTAL PAH HQ =	3.4E-05
Inorganics													

Detailed Baseline Case Hazard Quotient **Detailed Baseline Case Hazard Quotients for the Red-tailed Hawk Exposed to CoPCs at E**

Detailed Baseline Case Hazard Quotients for the Red-tailed Hawk Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Mammal Ingestion HQ	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS									
Aliph>C06-C08 - F1	9.8E+00	1.1E-02	1.1E-03	1.3E-02	1.3E-03	1.5E-04	1.5E-05	---	2.4E-03
Aliph>C08-C10 - F1	9.8E+00	7.1E-03	7.3E-04	2.0E-03	2.1E-04	9.8E-05	1.0E-05	---	9.5E-04
Arom>C08-C10 - F1	2.0E+01	1.8E-03	9.1E-05	3.1E-03	1.6E-04	2.5E-05	1.3E-06	---	2.5E-04
F1 - Total									3.6E-03
Aliph>C10-C12 - F2	4.9E+01	2.8E-01	5.7E-03	1.3E-02	2.6E-04	4.9E-04	1.0E-05	---	6.0E-03
Aliph>C12-C16 - F2	4.9E+01	3.4E-01	7.0E-03	8.4E-03	1.7E-04	6.0E-04	1.2E-05	---	7.2E-03
Arom>C10-C12 - F2	9.8E+00	7.0E-02	7.2E-03	5.1E-02	5.2E-03	1.2E-04	1.3E-05	---	1.2E-02
Arom>C12-C16 - F2	9.8E+00	8.6E-02	8.8E-03	4.4E-02	4.5E-03	1.5E-04	1.5E-05	---	1.3E-02
F2 - Total									3.9E-02
Aliph>C16-C21 - F3	2.0E+02	5.9E-02	3.0E-04	1.4E-03	7.4E-06	3.0E-02	1.5E-04	---	4.6E-04
Aliph>C21-C34 - F3	2.0E+02	2.5E-02	1.3E-04	3.1E-04	1.6E-06	1.3E-02	6.6E-05	---	2.0E-04
Arom>C16-C21 - F3	9.8E+00	1.5E-02	1.5E-03	2.8E-03	2.9E-04	7.5E-03	7.7E-04	---	2.6E-03
Arom>C21-C34 - F3	9.8E+00	6.3E-03	6.5E-04	3.0E-04	3.0E-05	3.2E-03	3.3E-04	---	1.0E-03
F3 - Total									4.2E-03
								Total TPH HQ =	4.7E-02
Polycyclic Aromatic Hydrocarbons									
Low Molecular Weight PAHs									
Acenaphthene	--	1.6E-04	---	2.0E-04	---	2.7E-07	---	---	---
Acenaphthylene	--	4.8E-05	---	1.2E-04	---	2.7E-07	---	---	---
Anthracene	--	1.2E-05	---	8.1E-05	---	2.7E-07	---	---	---
Fluoranthene	--	1.5E-05	---	1.0E-04	---	2.7E-07	---	---	---
Fluorene	--	9.0E-05	---	1.8E-04	---	2.7E-07	---	---	---
1-Methylnaphthalene	--	6.6E-04	---	4.1E-04	---	2.7E-07	---	---	---
2-Methylnaphthalene	--	9.0E-04	---	4.8E-04	---	2.7E-07	---	---	---
Naphthalene	--	2.3E-04	---	1.5E-04	---	2.7E-07	---	---	---
Phenanthrene	--	3.3E-04	---	4.0E-04	---	2.7E-07	---	---	---
								TOTAL LPAH HQ =	---
High Molecular Weight PAHs									
Benz(a)anthracene	--	3.0E-06	---	3.0E-06	---	2.7E-07	---	---	---
Benzo(a)pyrene	--	3.0E-06	---	1.4E-05	---	2.7E-07	---	---	---
Benzo(b)fluoranthene	--	3.0E-06	---	2.7E-06	---	2.7E-07	---	---	---
Benzo(g,h,i)perylene	--	3.0E-06	---	1.2E-05	---	2.7E-07	---	---	---
Benzo(j)fluoranthene	--	3.0E-06	---	1.2E-05	---	2.7E-07	---	---	---
Benzo(k)fluoranthene	--	3.0E-06	---	2.7E-06	---	2.7E-07	---	---	---
Chrysene	--	7.2E-06	---	6.9E-06	---	2.7E-07	---	---	---
Dibenz(a,h)anthracene	--	3.0E-06	---	1.2E-05	---	2.7E-07	---	---	---
Indeno(1,2,3-cd)pyrene	--	3.0E-06	---	1.2E-05	---	2.7E-07	---	---	---
Perylene	--	3.0E-06	---	1.3E-05	---	2.7E-07	---	---	---
Pyrene	--	1.7E-05	---	1.5E-05	---	2.7E-07	---	---	---
								TOTAL HPAH HQ =	---
								TOTAL PAH HQ =	---
Inorganics									

Detailed Baseline Case Hazard Quotients for the Common Merganser Exposed to CoPCs at Border E

Detailed Baseline Case Hazard Quotients for the Common Merganser Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Average Daily Dose (mg/kg-day)	Freshwater Sediment Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS							
Aliph>C06-C08 - F1	9.0E+00	1.5E-04	1.6E-05	3.9E-04	4.3E-05	---	6.0E-05
Aliph>C08-C10 - F1	9.0E+00	9.6E-05	1.1E-05	2.6E-04	2.8E-05	---	3.9E-05
Arom>C08-C10 - F1	1.8E+01	2.4E-05	1.3E-06	6.4E-05	3.5E-06	---	4.9E-06
F1 - Total							1.0E-04
Aliph>C10-C12 - F2	4.5E+01	4.8E-04	1.1E-05	1.0E-03	2.3E-05	---	3.3E-05
Aliph>C12-C16 - F2	4.5E+01	5.9E-04	1.3E-05	1.3E-03	2.8E-05	---	4.1E-05
Arom>C10-C12 - F2	9.0E+00	1.2E-04	1.3E-05	2.6E-04	2.8E-05	---	4.2E-05
Arom>C12-C16 - F2	9.0E+00	1.5E-04	1.6E-05	3.1E-04	3.5E-05	---	5.1E-05
F2 - Total							1.7E-04
Aliph>C16-C21 - F3	1.8E+02	2.9E-02	1.6E-04	2.6E-02	1.5E-04	---	3.1E-04
Aliph>C21-C34 - F3	1.8E+02	1.3E-02	6.9E-05	1.1E-02	6.3E-05	---	1.3E-04
Arom>C16-C21 - F3	9.0E+00	7.3E-03	8.1E-04	6.6E-03	7.3E-04	---	1.5E-03
Arom>C21-C34 - F3	9.0E+00	3.1E-03	3.5E-04	2.8E-03	3.1E-04	---	6.6E-04
F3 - Total							2.6E-03
						Total TPH HQ =	2.9E-03
Polycyclic Aromatic Hydrocarbons							
Low Molecular Weight PAHs							
Acenaphthene	--	2.7E-07	---	8.0E-06	---	---	---
Acenaphthylene	--	2.7E-07	---	2.9E-06	---	---	---
Anthracene	--	2.7E-07	---	2.9E-06	---	---	---
Fluoranthene	--	2.7E-07	---	2.9E-06	---	---	---
Fluorene	--	2.7E-07	---	2.9E-06	---	---	---
1-Methylnaphthalene	--	2.7E-07	---	1.2E-05	---	---	---
2-Methylnaphthalene	--	2.7E-07	---	1.4E-05	---	---	---
Naphthalene	--	2.7E-07	---	2.9E-06	---	---	---
Phenanthrene	--	2.7E-07	---	2.9E-06	---	---	---
						TOTAL LPAH HQ =	---
High Molecular Weight PAHs							
Benz(a)anthracene	--	2.7E-07	---	2.9E-06	---	---	---
Benzo(a)pyrene	--	2.7E-07	---	2.9E-06	---	---	---
Benzo(b)fluoranthene	--	2.7E-07	---	2.9E-06	---	---	---
Benzo(g,h,i)perylene	--	2.7E-07	---	2.9E-06	---	---	---
Benzo(j)fluoranthene	--	2.7E-07	---	2.9E-06	---	---	---
Benzo(k)fluoranthene	--	2.7E-07	---	2.9E-06	---	---	---
Chrysene	--	2.7E-07	---	2.9E-06	---	---	---
Dibenz(a,h)anthracene	--	2.7E-07	---	2.9E-06	---	---	---
Indeno(1,2,3-cd)pyrene	--	2.7E-07	---	2.9E-06	---	---	---
Perylene	--	2.7E-07	---	2.9E-06	---	---	---
Pyrene	--	2.7E-07	---	2.9E-06	---	---	---
						TOTAL HPAH HQ =	---
						TOTAL PAH HQ =	---
Inorganics							

Detailed Baseline Case Hazard Quotients for the American Robin Exposed to CoPCs at Border Beacon Receptor Location

Detailed Baseline Case Hazard Quotients for the American Robin Exposed to CoPCs at Border Beacon Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Average Daily Dose (mg/kg-day)	Surface Water Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS											
Aliph>C06-C08 - F1	1.0E+01	1.1E-01	1.1E-02	1.1E+00	1.1E-01	6.9E-01	6.9E-02	3.4E-04	3.4E-05	---	1.9E-01
Aliph>C08-C10 - F1	1.0E+01	7.2E-02	7.2E-03	9.4E-02	9.4E-03	4.5E-01	4.5E-02	2.3E-04	2.3E-05	---	6.2E-02
Arom>C08-C10 - F1	2.0E+01	1.8E-02	9.0E-04	3.8E-01	1.9E-02	1.1E-01	5.7E-03	5.6E-05	2.8E-06	---	2.6E-02
F1 - Total											2.8E-01
Aliph>C10-C12 - F2	5.0E+01	2.8E+00	5.7E-02	2.4E-01	4.8E-03	1.1E+01	2.2E-01	1.1E-03	2.3E-05	---	2.8E-01
Aliph>C12-C16 - F2	5.0E+01	3.5E+00	6.9E-02	2.1E-02	4.3E-04	1.1E+01	2.2E-01	1.4E-03	2.8E-05	---	2.9E-01
Arom>C10-C12 - F2	1.0E+01	7.1E-01	7.1E-02	1.1E+01	1.1E+00	2.8E+00	2.8E-01	2.8E-04	2.8E-05	---	**1.4E+00**
Arom>C12-C16 - F2	1.0E+01	8.7E-01	8.7E-02	7.4E+00	7.4E-01	3.4E+00	3.4E-01	3.4E-04	3.4E-05	---	**1.2E+00**
F2 - Total											**3.2E+00**
Aliph>C16-C21 - F3	2.0E+02	6.0E-01	3.0E-03	3.7E-03	1.8E-05	1.9E+00	9.3E-03	6.9E-02	3.4E-04	---	1.3E-02
Aliph>C21-C34 - F3	2.0E+02	2.6E-01	1.3E-03	1.6E-03	7.9E-06	4.0E-01	2.0E-03	2.9E-02	1.5E-04	---	3.4E-03
Arom>C16-C21 - F3	1.0E+01	1.5E-01	1.5E-02	4.2E-01	4.2E-02	4.7E-01	4.7E-02	1.7E-02	1.7E-03	---	1.1E-01
Arom>C21-C34 - F3	1.0E+01	6.4E-02	6.4E-03	1.5E-02	1.5E-03	2.0E-01	2.0E-02	7.4E-03	7.4E-04	---	2.9E-02
F3 - Total											1.5E-01
										Total TPH HQ =	**3.6E+00**
Polycyclic Aromatic Hydrocarbons											
Low Molecular Weight PAHs											
Acenaphthene	--	1.6E-03	---	9.2E-03	---	3.3E-03	---	6.3E-07	---	---	---
Acenaphthylene	--	4.8E-04	---	5.4E-03	---	1.0E-03	---	6.3E-07	---	---	---
Anthracene	--	1.2E-04	---	2.9E-03	---	2.5E-04	---	6.3E-07	---	---	---
Fluoranthene	--	1.5E-04	---	3.2E-03	---	3.1E-04	---	6.3E-07	---	---	---
Fluorene	--	9.1E-04	---	7.2E-03	---	1.9E-03	---	6.3E-07	---	---	---
1-Methylnaphthalene	--	6.7E-03	---	1.8E-02	---	1.4E-02	---	6.3E-07	---	---	---
2-Methylnaphthalene	--	9.1E-03	---	2.0E-02	---	1.9E-02	---	6.3E-07	---	---	---
Naphthalene	--	2.3E-03	---	1.1E-02	---	5.0E-03	---	6.3E-07	---	---	---
Phenanthrene	--	3.3E-03	---	1.3E-02	---	6.9E-03	---	6.3E-07	---	---	---
										TOTAL LPAH HQ =	---
High Molecular Weight PAHs											
Benz(a)anthracene	--	3.0E-05	---	7.7E-05	---	3.1E-05	---	6.3E-07	---	---	---
Benzo(a)pyrene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Benzo(b)fluoranthene	--	3.0E-05	---	7.7E-05	---	3.1E-05	---	6.3E-07	---	---	---
Benzo(g,h,i)perylene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Benzo(j)fluoranthene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Benzo(k)fluoranthene	--	3.0E-05	---	7.7E-05	---	3.1E-05	---	6.3E-07	---	---	---
Chrysene	--	7.3E-05	---	1.8E-04	---	7.6E-05	---	6.3E-07	---	---	---
Dibenz(a,h)anthracene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Indeno(1,2,3-cd)pyrene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Perylene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	6.3E-07	---	---	---
Pyrene	--	1.7E-04	---	3.9E-04	---	1.8E-04	---	6.3E-07	---	---	---
										TOTAL HPAH HQ =	---
										TOTAL PAH HQ =	---
Inorganics											

ERA

Upper Site

Procul Input and Output
Upper Site

Metals Upper Site
Border Beacon
Project No. 121414998

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	**cadmium**	**D_cadmium**	**chromium**	**D_chromium**	**copper**	**D_copper**	**lead**	**D_lead**	**nickel**	**D_nickel**	**zinc**	**D_zinc**	**F1**	**D_F1**	**F2**	**D_F2**	**F3**	**D_F3**
2	0.3	0	24	1	8.8	1	5.8	1	8.7	1	33	1	2.5	0	10	0	38	1
3	61	1	190	1	6900	1	550	1	290	1	8000	1	2.5	0	10	0	620	1
4	0.3	0	26	1	9.6	1	5.9	1	10	1	94	1	2.5	0	790	1	30000	1
5	0.3	0	22	1	36	1	10	1	8.9	1	94	1	2.5	0	10	0	45	1
6	0.3	0	14	1	21	1	9.2	1	6.2	1	220	1	3.4	1	150	1	97	1
7	0.3	0	27	1	21	1	16	1	11	1	130	1	2.5	0	10	0	200	1
8	0.3	0	27	1	71	1	12	1	9.5	1	150	1	2.5	0	10	0	20	1
9	1.4	1	5.3	1	530	1	88	1	2	0	1200	1	2.5	0	10	0	36	1
10	0.3	0	20	1	12	1	6	1	7.3	1	30	1	2.5	0	10	0	33	1
11	0.3	0	18	1	15	1	5.6	1	8.3	1	89	1	2.5	0	10	0	25	0
12	0.3	0	19	1	13	1	5.2	1	7.6	1	32	1	2.5	0	10	0	140	1
13	0.3	0	32	1	18	1	8.8	1	13	1	61	1	2.5	0	10	0	120	1
14	0.3	0	19	1	8.7	1	5.9	1	7.3	1	33	1	2.5	0	30	1	4900	1
15	0.3	0	26	1	12	1	6.7	1	8.3	1	110	1	2.5	0	13	1	470	1
16	0.3	0	30	1	19	1	6.7	1	12	1	40	1	2.5	0	37	1	150	1
17	0.3	0	22	1	19	1	48	1	7	1	57	1	2.5	0	350	1	18000	1
18	0.3	0	23	1	25	1	84	1	8.4	1	76	1	2.5	0	82	1	820	1
19	4.3	1	170	1	48000	1	2100	1	510	1	4600	1	2.5	0	10	0	47	1
20	0.62	1	30	1	180	1	31	1	12	1	380	1	2.5	0	10	0	25	0
21	0.41	1	26	1	68	1	15	1	8.7	1	140	1	2.5	0	10	0	48	1
22	0.3	0	2.1	1	2	0	4	1	2	0	9.1	1	2.5	0	10	0	25	0
23													2.5	0	10	0	300	1
24													2.5	0	10	0	25	0
25													2.5	0	10	0	52	1
26													2.5	0	10	0	54	1
27													2.5	0	10	0	25	0
28													2.5	0	10	0	180	1
29													2.5	0	10	0	25	0
30													2.5	0	50	1	25	0
31													2.5	0	10	0	17	1
32													2.5	0	28000	1	4900	1

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 10:03:27 AM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Cd

General Statistics

Total Number of Observations	21	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	16
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.41	Minimum Non-Detect	0.3
Maximum Detect	61	Maximum Non-Detect	0.3
Variance Detects	706.1	Percent Non-Detects	76.19%
Mean Detects	13.55	SD Detects	26.57
Median Detects	1.4	CV Detects	1.962
Skewness Detects	2.217	Kurtosis Detects	4.93
Mean of Logged Detects	0.907	SD of Logged Detects	2.003

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.6	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.436	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.454	KM Standard Error of Mean	3.147
KM SD	12.9	95% KM (BCA) UCL	9.192
95% KM (t) UCL	8.881	95% KM (Percentile Bootstrap) UCL	9.127
95% KM (z) UCL	8.629	95% KM Bootstrap t UCL	107.8
90% KM Chebyshev UCL	12.89	95% KM Chebyshev UCL	17.17
97.5% KM Chebyshev UCL	23.1	99% KM Chebyshev UCL	34.76

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.618	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.318	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.376	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.389	k star (bias corrected MLE)	0.289
Theta hat (MLE)	34.82	Theta star (bias corrected MLE)	46.88
nu hat (MLE)	3.891	nu star (bias corrected)	2.89
Mean (detects)	13.55		

51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	3.233	
59					Maximum	61				Median	0.01	
60					SD	13.27				CV	4.105	
61					k hat (MLE)	0.169				k star (bias corrected MLE)	0.177	
62					Theta hat (MLE)	19.12				Theta star (bias corrected MLE)	18.3	
63					nu hat (MLE)	7.101				nu star (bias corrected)	7.42	
64					Adjusted Level of Significance (β)	0.0383						
65					Approximate Chi Square Value (7.42, α)	2.404				Adjusted Chi Square Value (7.42, β)	2.19	
66					95% Gamma Approximate UCL (use when n>=50)	9.979				95% Gamma Adjusted UCL (use when n<50)	10.95	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	3.454				SD (KM)	12.9	
70					Variance (KM)	166.3				SE of Mean (KM)	3.147	
71					k hat (KM)	0.0717				k star (KM)	0.0932	
72					nu hat (KM)	3.012				nu star (KM)	3.915	
73					theta hat (KM)	48.16				theta star (KM)	37.05	
74					80% gamma percentile (KM)	2.154				90% gamma percentile (KM)	8.909	
75					95% gamma percentile (KM)	20.11				99% gamma percentile (KM)	56.81	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (3.92, α)	0.688				Adjusted Chi Square Value (3.92, β)	0.596	
79					95% Gamma Approximate KM-UCL (use when n>=50)	19.64				95% Gamma Adjusted KM-UCL (use when n<50)	22.7	
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)											
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.896				**Shapiro Wilk GOF Test**		
84					5% Shapiro Wilk Critical Value	0.762				Detected Data appear Lognormal at 5% Significance Level		
85					Lilliefors Test Statistic	0.212				**Lilliefors GOF Test**		
86					5% Lilliefors Critical Value	0.343				Detected Data appear Lognormal at 5% Significance Level		
87	**Detected Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	3.231				Mean in Log Scale	-5.9	
91					SD in Original Scale	13.27				SD in Log Scale	5.104	
92					95% t UCL (assumes normality of ROS data)	8.226				95% Percentile Bootstrap UCL	8.824	
93					95% BCA Bootstrap UCL	11.98				95% Bootstrap t UCL	132.7	
94					95% H-UCL (Log ROS)	86610870						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-0.701				KM Geo Mean	0.496	
98					KM SD (logged)	1.254				95% Critical H Value (KM-Log)	2.929	
99					KM Standard Error of Mean (logged)	0.306				95% H-UCL (KM -Log)	2.476	
100					KM SD (logged)	1.254				95% Critical H Value (KM-Log)	2.929	

101	KM Standard Error of Mean (logged)					0.306						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					3.34	Mean in Log Scale					-1.229
106	SD in Original Scale					13.24	SD in Log Scale					1.517
107	95% t UCL (Assumes normality)					8.324	95% H-Stat UCL					2.866
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					22.7						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												
121												
122	**Cr**											
123												
124	**General Statistics**											
125	Total Number of Observations					21	Number of Distinct Observations					15
126							Number of Missing Observations					0
127	Minimum					2.1	Mean					36.78
128	Maximum					190	Median					24
129	SD					48.29	Std. Error of Mean					10.54
130	Coefficient of Variation					1.313	Skewness					2.863
131												
132	**Normal GOF Test**											
133	Shapiro Wilk Test Statistic					0.491	**Shapiro Wilk GOF Test**					
134	5% Shapiro Wilk Critical Value					0.908	Data Not Normal at 5% Significance Level					
135	Lilliefors Test Statistic					0.444	**Lilliefors GOF Test**					
136	5% Lilliefors Critical Value					0.188	Data Not Normal at 5% Significance Level					
137	**Data Not Normal at 5% Significance Level**											
138												
139	**Assuming Normal Distribution**											
140	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
141	95% Student's-t UCL					54.96	95% Adjusted-CLT UCL (Chen-1995)					61.15
142							95% Modified-t UCL (Johnson-1978)					56.05
143												
144	**Gamma GOF Test**											
145	A-D Test Statistic					2.61	**Anderson-Darling Gamma GOF Test**					
146	5% A-D Critical Value					0.764	Data Not Gamma Distributed at 5% Significance Level					
147	K-S Test Statistic					0.345	**Kolmogorov-Smirnov Gamma GOF Test**					
148	5% K-S Critical Value					0.194	Data Not Gamma Distributed at 5% Significance Level					
149	**Data Not Gamma Distributed at 5% Significance Level**											
150												

151	**Gamma Statistics**											
152					k hat (MLE)	1.261				k star (bias corrected MLE)		1.113
153					Theta hat (MLE)	29.16				Theta star (bias corrected MLE)		33.05
154					nu hat (MLE)	52.98				nu star (bias corrected)		46.74
155					MLE Mean (bias corrected)	36.78				MLE Sd (bias corrected)		34.86
156										Approximate Chi Square Value (0.05)		32.06
157					Adjusted Level of Significance	0.0383				Adjusted Chi Square Value		31.12
158												
159	**Assuming Gamma Distribution**											
160			95% Approximate Gamma UCL (use when n>=50))			53.64				95% Adjusted Gamma UCL (use when n<50)		55.25
161												
162	**Lognormal GOF Test**											
163					Shapiro Wilk Test Statistic	0.803				**Shapiro Wilk Lognormal GOF Test**		
164					5% Shapiro Wilk Critical Value	0.908				Data Not Lognormal at 5% Significance Level		
165					Lilliefors Test Statistic	0.275				**Lilliefors Lognormal GOF Test**		
166					5% Lilliefors Critical Value	0.188				Data Not Lognormal at 5% Significance Level		
167	**Data Not Lognormal at 5% Significance Level**											
168												
169	**Lognormal Statistics**											
170					Minimum of Logged Data	0.742				Mean of logged Data		3.159
171					Maximum of Logged Data	5.247				SD of logged Data		0.924
172												
173	**Assuming Lognormal Distribution**											
174					95% H-UCL	60.04				90% Chebyshev (MVUE) UCL		58.67
175					95% Chebyshev (MVUE) UCL	69.34				97.5% Chebyshev (MVUE) UCL		84.15
176					99% Chebyshev (MVUE) UCL	113.2						
177												
178	**Nonparametric Distribution Free UCL Statistics**											
179	**Data do not follow a Discernible Distribution (0.05)**											
180												
181	**Nonparametric Distribution Free UCLs**											
182					95% CLT UCL	54.12				95% Jackknife UCL		54.96
183					95% Standard Bootstrap UCL	53.84				95% Bootstrap-t UCL		138.8
184					95% Hall's Bootstrap UCL	200.1				95% Percentile Bootstrap UCL		54.62
185					95% BCA Bootstrap UCL	61.25						
186					90% Chebyshev(Mean, Sd) UCL	68.4				95% Chebyshev(Mean, Sd) UCL		82.72
187					97.5% Chebyshev(Mean, Sd) UCL	102.6				99% Chebyshev(Mean, Sd) UCL		141.6
188												
189	**Suggested UCL to Use**											
190					95% Chebyshev (Mean, Sd) UCL	82.72						
191												
192	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
193	Recommendations are based upon data size, data distribution, and skewness.											
194	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
195	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
196												
197	**Cu**											
198												
199	**General Statistics**											
200					Total Number of Observations	21				Number of Distinct Observations		18

201					Number of Detects	20				Number of Non-Detects	1	
202					Number of Distinct Detects	17				Number of Distinct Non-Detects	1	
203					Minimum Detect	8.7				Minimum Non-Detect	2	
204					Maximum Detect	48000				Maximum Non-Detect	2	
205					Variance Detects	1.155E+8				Percent Non-Detects	4.762%	
206					Mean Detects	2799				SD Detects	10749	
207					Median Detects	20				CV Detects	3.84	
208					Skewness Detects	4.334				Kurtosis Detects	19.06	
209					Mean of Logged Detects	3.904				SD of Logged Detects	2.294	
210												
211	**Normal GOF Test on Detects Only**											
212					Shapiro Wilk Test Statistic	0.287	**Shapiro Wilk GOF Test**					
213					5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level					
214					Lilliefors Test Statistic	0.484	**Lilliefors GOF Test**					
215					5% Lilliefors Critical Value	0.192	Detected Data Not Normal at 5% Significance Level					
216	**Detected Data Not Normal at 5% Significance Level**											
217												
218	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
219					KM Mean	2666				KM Standard Error of Mean	2293	
220					KM SD	10242				95% KM (BCA) UCL	7207	
221					95% KM (t) UCL	6621				95% KM (Percentile Bootstrap) UCL	7211	
222					95% KM (z) UCL	6438				95% KM Bootstrap t UCL	246974	
223					90% KM Chebyshev UCL	9545				95% KM Chebyshev UCL	12661	
224					97.5% KM Chebyshev UCL	16986				99% KM Chebyshev UCL	25481	
225												
226	**Gamma GOF Tests on Detected Observations Only**											
227					A-D Test Statistic	4.431	**Anderson-Darling GOF Test**					
228					5% A-D Critical Value	0.907	Detected Data Not Gamma Distributed at 5% Significance Level					
229					K-S Test Statistic	0.398	**Kolmogorov-Smirnov GOF**					
230					5% K-S Critical Value	0.216	Detected Data Not Gamma Distributed at 5% Significance Level					
231	**Detected Data Not Gamma Distributed at 5% Significance Level**											
232												
233	**Gamma Statistics on Detected Data Only**											
234					k hat (MLE)	0.185				k star (bias corrected MLE)	0.19	
235					Theta hat (MLE)	15154				Theta star (bias corrected MLE)	14706	
236					nu hat (MLE)	7.389				nu star (bias corrected)	7.614	
237					Mean (detects)	2799						
238												
239	**Gamma ROS Statistics using Imputed Non-Detects**											
240	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
241	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
242	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
243	This is especially true when the sample size is small.											
244	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
245					Minimum	0.01				Mean	2666	
246					Maximum	48000				Median	19	
247					SD	10494				CV	3.936	
248					k hat (MLE)	0.172				k star (bias corrected MLE)	0.179	
249					Theta hat (MLE)	15533				Theta star (bias corrected MLE)	14906	
250					nu hat (MLE)	7.209				nu star (bias corrected)	7.512	

251					Adjusted Level of Significance (β)	0.0383						
252					Approximate Chi Square Value (7.51, α)	2.456				Adjusted Chi Square Value (7.51, β)		2.239
253					95% Gamma Approximate UCL (use when n>=50)	8155				95% Gamma Adjusted UCL (use when n<50)		8944
254												
255					**Estimates of Gamma Parameters using KM Estimates**							
256					Mean (KM)	2666				SD (KM)		10242
257					Variance (KM)	1.049E+8				SE of Mean (KM)		2293
258					k hat (KM)	0.0678				k star (KM)		0.0898
259					nu hat (KM)	2.846				nu star (KM)		3.773
260					theta hat (KM)	39341				theta star (KM)		29678
261					80% gamma percentile (KM)	1565				90% gamma percentile (KM)		6753
262					95% gamma percentile (KM)	15534				99% gamma percentile (KM)		44657
263												
264					**Gamma Kaplan-Meier (KM) Statistics**							
265					Approximate Chi Square Value (3.77, α)	0.634				Adjusted Chi Square Value (3.77, β)		0.547
266					95% Gamma Approximate KM-UCL (use when n>=50)	15863				95% Gamma Adjusted KM-UCL (use when n<50)		18399
267					95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)							
268												
269					**Lognormal GOF Test on Detected Observations Only**							
270					Shapiro Wilk Test Statistic	0.714				**Shapiro Wilk GOF Test**		
271					5% Shapiro Wilk Critical Value	0.905				Detected Data Not Lognormal at 5% Significance Level		
272					Lilliefors Test Statistic	0.267				**Lilliefors GOF Test**		
273					5% Lilliefors Critical Value	0.192				Detected Data Not Lognormal at 5% Significance Level		
274					**Detected Data Not Lognormal at 5% Significance Level**							
275												
276					**Lognormal ROS Statistics Using Imputed Non-Detects**							
277					Mean in Original Scale	2666				Mean in Log Scale		3.67
278					SD in Original Scale	10494				SD in Log Scale		2.48
279					95% t UCL (assumes normality of ROS data)	6616				95% Percentile Bootstrap UCL		7209
280					95% BCA Bootstrap UCL	9812				95% Bootstrap t UCL		240875
281					95% H-UCL (Log ROS)	13431						
282												
283					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
284					KM Mean (logged)	3.751				KM Geo Mean		42.57
285					KM SD (logged)	2.287				95% Critical H Value (KM-Log)		4.637
286					KM Standard Error of Mean (logged)	0.512				95% H-UCL (KM -Log)		6230
287					KM SD (logged)	2.287				95% Critical H Value (KM-Log)		4.637
288					KM Standard Error of Mean (logged)	0.512						
289												
290					**DL/2 Statistics**							
291					**DL/2 Normal**					**DL/2 Log-Transformed**		
292					Mean in Original Scale	2666				Mean in Log Scale		3.718
293					SD in Original Scale	10494				SD in Log Scale		2.393
294					95% t UCL (Assumes normality)	6616				95% H-Stat UCL		9528
295					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
296												
297					**Nonparametric Distribution Free UCL Statistics**							
298					**Data do not follow a Discernible Distribution at 5% Significance Level**							
299												
300					**Suggested UCL to Use**							

301					97.5% KM (Chebyshev) UCL	16986						
302												
303	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
304	Recommendations are based upon data size, data distribution, and skewness.											
305	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
306	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
307												
308												
309	**Pb**											
310												
311	**General Statistics**											
312					Total Number of Observations	21			Number of Distinct Observations	19		
313									Number of Missing Observations	0		
314					Minimum	4			Mean	144		
315					Maximum	2100			Median	9.2		
316					SD	463.5			Std. Error of Mean	101.1		
317					Coefficient of Variation	3.219			Skewness	4.169		
318												
319	**Normal GOF Test**											
320					Shapiro Wilk Test Statistic	0.334			**Shapiro Wilk GOF Test**			
321					5% Shapiro Wilk Critical Value	0.908			Data Not Normal at 5% Significance Level			
322					Lilliefors Test Statistic	0.453			**Lilliefors GOF Test**			
323					5% Lilliefors Critical Value	0.188			Data Not Normal at 5% Significance Level			
324	**Data Not Normal at 5% Significance Level**											
325												
326	**Assuming Normal Distribution**											
327					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
328					95% Student's-t UCL	318.4			95% Adjusted-CLT UCL (Chen-1995)	408.7		
329									95% Modified-t UCL (Johnson-1978)	333.8		
330												
331	**Gamma GOF Test**											
332					A-D Test Statistic	3.637			**Anderson-Darling Gamma GOF Test**			
333					5% A-D Critical Value	0.841			Data Not Gamma Distributed at 5% Significance Level			
334					K-S Test Statistic	0.338			**Kolmogorov-Smirnov Gamma GOF Test**			
335					5% K-S Critical Value	0.205			Data Not Gamma Distributed at 5% Significance Level			
336	**Data Not Gamma Distributed at 5% Significance Level**											
337												
338	**Gamma Statistics**											
339					k hat (MLE)	0.326			k star (bias corrected MLE)	0.311		
340					Theta hat (MLE)	442.1			Theta star (bias corrected MLE)	463.1		
341					nu hat (MLE)	13.68			nu star (bias corrected)	13.06		
342					MLE Mean (bias corrected)	144			MLE Sd (bias corrected)	258.2		
343									Approximate Chi Square Value (0.05)	5.932		
344					Adjusted Level of Significance	0.0383			Adjusted Chi Square Value	5.566		
345												
346	**Assuming Gamma Distribution**											
347					95% Approximate Gamma UCL (use when n>=50))	317			95% Adjusted Gamma UCL (use when n<50)	337.8		
348												
349	**Lognormal GOF Test**											
350					Shapiro Wilk Test Statistic	0.774			**Shapiro Wilk Lognormal GOF Test**			

351	5% Shapiro Wilk Critical Value					0.908	Data Not Lognormal at 5% Significance Level					
352	Lilliefors Test Statistic					0.241	**Lilliefors Lognormal GOF Test**					
353	5% Lilliefors Critical Value					0.188	Data Not Lognormal at 5% Significance Level					
354	**Data Not Lognormal at 5% Significance Level**											
355												
356	**Lognormal Statistics**											
357	Minimum of Logged Data					1.386	Mean of logged Data					2.881
358	Maximum of Logged Data					7.65	SD of logged Data					1.645
359												
360	**Assuming Lognormal Distribution**											
361	95% H-UCL					254	90% Chebyshev (MVUE) UCL					140.1
362	95% Chebyshev (MVUE) UCL					176.1	97.5% Chebyshev (MVUE) UCL					226.2
363	99% Chebyshev (MVUE) UCL					324.5						
364												
365	**Nonparametric Distribution Free UCL Statistics**											
366	**Data do not follow a Discernible Distribution (0.05)**											
367												
368	**Nonparametric Distribution Free UCLs**											
369	95% CLT UCL					310.4	95% Jackknife UCL					318.4
370	95% Standard Bootstrap UCL					304.8	95% Bootstrap-t UCL					2580
371	95% Hall's Bootstrap UCL					1721	95% Percentile Bootstrap UCL					339.8
372	95% BCA Bootstrap UCL					466.4						
373	90% Chebyshev(Mean, Sd) UCL					447.4	95% Chebyshev(Mean, Sd) UCL					584.9
374	97.5% Chebyshev(Mean, Sd) UCL					775.6	99% Chebyshev(Mean, Sd) UCL					1150
375												
376	**Suggested UCL to Use**											
377	95% Chebyshev (Mean, Sd) UCL					584.9						
378												
379	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
380	Recommendations are based upon data size, data distribution, and skewness.											
381	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
382	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
383												
384	**Ni**											
385												
386	**General Statistics**											
387	Total Number of Observations					21	Number of Distinct Observations					16
388	Number of Detects					19	Number of Non-Detects					2
389	Number of Distinct Detects					15	Number of Distinct Non-Detects					1
390	Minimum Detect					6.2	Minimum Non-Detect					2
391	Maximum Detect					510	Maximum Non-Detect					2
392	Variance Detects					16541	Percent Non-Detects					9.524%
393	Mean Detects					50.22	SD Detects					128.6
394	Median Detects					8.7	CV Detects					2.561
395	Skewness Detects					3.204	Kurtosis Detects					10.06
396	Mean of Logged Detects					2.581	SD of Logged Detects					1.208
397												
398	**Normal GOF Test on Detects Only**											
399	Shapiro Wilk Test Statistic					0.382	**Shapiro Wilk GOF Test**					
400	5% Shapiro Wilk Critical Value					0.901	Detected Data Not Normal at 5% Significance Level					

401					Lilliefors Test Statistic	0.509	**Lilliefors GOF Test**					
402					5% Lilliefors Critical Value	0.197	Detected Data Not Normal at 5% Significance Level					
403	**Detected Data Not Normal at 5% Significance Level**											
404												
405	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
406					KM Mean	45.63				KM Standard Error of Mean	26.88	
407					KM SD	119.9				95% KM (BCA) UCL	104.3	
408					95% KM (t) UCL	92				95% KM (Percentile Bootstrap) UCL	93.43	
409					95% KM (z) UCL	89.85				95% KM Bootstrap t UCL	1730	
410					90% KM Chebyshev UCL	126.3				95% KM Chebyshev UCL	162.8	
411					97.5% KM Chebyshev UCL	213.5				99% KM Chebyshev UCL	313.1	
412												
413	**Gamma GOF Tests on Detected Observations Only**											
414					A-D Test Statistic	5.159	**Anderson-Darling GOF Test**					
415					5% A-D Critical Value	0.807	Detected Data Not Gamma Distributed at 5% Significance Level					
416					K-S Test Statistic	0.495	**Kolmogorov-Smirnov GOF**					
417					5% K-S Critical Value	0.211	Detected Data Not Gamma Distributed at 5% Significance Level					
418	**Detected Data Not Gamma Distributed at 5% Significance Level**											
419												
420	**Gamma Statistics on Detected Data Only**											
421					k hat (MLE)	0.479				k star (bias corrected MLE)	0.438	
422					Theta hat (MLE)	104.9				Theta star (bias corrected MLE)	114.6	
423					nu hat (MLE)	18.2				nu star (bias corrected)	16.66	
424					Mean (detects)	50.22						
425												
426	**Gamma ROS Statistics using Imputed Non-Detects**											
427	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
428	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
429	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
430	This is especially true when the sample size is small.											
431	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
432					Minimum	0.01				Mean	45.44	
433					Maximum	510				Median	8.7	
434					SD	122.9				CV	2.706	
435					k hat (MLE)	0.35				k star (bias corrected MLE)	0.332	
436					Theta hat (MLE)	129.7				Theta star (bias corrected MLE)	136.9	
437					nu hat (MLE)	14.71				nu star (bias corrected)	13.94	
438					Adjusted Level of Significance (β)	0.0383						
439					Approximate Chi Square Value (13.94, α)	6.531				Adjusted Chi Square Value (13.94, β)	6.144	
440					95% Gamma Approximate UCL (use when n>=50)	96.99				95% Gamma Adjusted UCL (use when n<50)	103.1	
441												
442	**Estimates of Gamma Parameters using KM Estimates**											
443					Mean (KM)	45.63				SD (KM)	119.9	
444					Variance (KM)	14378				SE of Mean (KM)	26.88	
445					k hat (KM)	0.145				k star (KM)	0.156	
446					nu hat (KM)	6.082				nu star (KM)	6.546	
447					theta hat (KM)	315.1				theta star (KM)	292.8	
448					80% gamma percentile (KM)	51.21				90% gamma percentile (KM)	136	
449					95% gamma percentile (KM)	249.2				99% gamma percentile (KM)	575.3	
450												

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (6.55, α)	1.925	Adjusted Chi Square Value (6.55, β)	1.739
95% Gamma Approximate KM-UCL (use when n>=50)	155.2	95% Gamma Adjusted KM-UCL (use when n<50)	171.8
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.524	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.901	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.4	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.197	Detected Data Not Lognormal at 5% Significance Level	
Detected Data Not Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	45.59	Mean in Log Scale	2.378
SD in Original Scale	122.9	SD in Log Scale	1.314
95% t UCL (assumes normality of ROS data)	91.84	95% Percentile Bootstrap UCL	93.99
95% BCA Bootstrap UCL	118.1	95% Bootstrap t UCL	1716
95% H-UCL (Log ROS)	62.13		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	2.401	KM Geo Mean	11.04
KM SD (logged)	1.248	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.28	95% H-UCL (KM -Log)	54.3
KM SD (logged)	1.248	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.28		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	45.53	Mean in Log Scale	2.335
SD in Original Scale	122.9	SD in Log Scale	1.384
95% t UCL (Assumes normality)	91.79	95% H-Stat UCL	70.86
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution at 5% Significance Level			
Suggested UCL to Use			
95% KM (Chebyshev) UCL	162.8		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness.			
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
Zn			
General Statistics			
Total Number of Observations	21	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	9.1	Mean	741.8

501					Maximum	8000					Median	94
502					SD	1941					Std. Error of Mean	423.6
503					Coefficient of Variation	2.617					Skewness	3.286
504												
505	**Normal GOF Test**											
506					Shapiro Wilk Test Statistic	0.417	**Shapiro Wilk GOF Test**					
507					5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level					
508					Lilliefors Test Statistic	0.431	**Lilliefors GOF Test**					
509					5% Lilliefors Critical Value	0.188	Data Not Normal at 5% Significance Level					
510	**Data Not Normal at 5% Significance Level**											
511												
512	**Assuming Normal Distribution**											
513	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
514					95% Student's-t UCL	1472	95% Adjusted-CLT UCL (Chen-1995)	1763				
515							95% Modified-t UCL (Johnson-1978)	1523				
516												
517	**Gamma GOF Test**											
518					A-D Test Statistic	2.912	**Anderson-Darling Gamma GOF Test**					
519					5% A-D Critical Value	0.831	Data Not Gamma Distributed at 5% Significance Level					
520					K-S Test Statistic	0.341	**Kolmogorov-Smirnov Gamma GOF Test**					
521					5% K-S Critical Value	0.204	Data Not Gamma Distributed at 5% Significance Level					
522	**Data Not Gamma Distributed at 5% Significance Level**											
523												
524	**Gamma Statistics**											
525					k hat (MLE)	0.372	k star (bias corrected MLE)	0.35				
526					Theta hat (MLE)	1995	Theta star (bias corrected MLE)	2117				
527					nu hat (MLE)	15.62	nu star (bias corrected)	14.72				
528					MLE Mean (bias corrected)	741.8	MLE Sd (bias corrected)	1253				
529							Approximate Chi Square Value (0.05)	7.066				
530					Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	6.661				
531												
532	**Assuming Gamma Distribution**											
533					95% Approximate Gamma UCL (use when n>=50))	1545	95% Adjusted Gamma UCL (use when n<50)	1639				
534												
535	**Lognormal GOF Test**											
536					Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk Lognormal GOF Test**					
537					5% Shapiro Wilk Critical Value	0.908	Data Not Lognormal at 5% Significance Level					
538					Lilliefors Test Statistic	0.215	**Lilliefors Lognormal GOF Test**					
539					5% Lilliefors Critical Value	0.188	Data Not Lognormal at 5% Significance Level					
540	**Data Not Lognormal at 5% Significance Level**											
541												
542	**Lognormal Statistics**											
543					Minimum of Logged Data	2.208	Mean of logged Data	4.818				
544					Maximum of Logged Data	8.987	SD of logged Data	1.648				
545												
546	**Assuming Lognormal Distribution**											
547					95% H-UCL	1778	90% Chebyshev (MVUE) UCL	977.2				
548					95% Chebyshev (MVUE) UCL	1229	97.5% Chebyshev (MVUE) UCL	1578				
549					99% Chebyshev (MVUE) UCL	2264						
550												

	A	B	C	D	E	F	G	H	I	J	K	L
551	**Nonparametric Distribution Free UCL Statistics**											
552	**Data do not follow a Discernible Distribution (0.05)**											
553												
554	**Nonparametric Distribution Free UCLs**											
555	95% CLT UCL					1439	95% Jackknife UCL					1472
556	95% Standard Bootstrap UCL					1441	95% Bootstrap-t UCL					5517
557	95% Hall's Bootstrap UCL					6462	95% Percentile Bootstrap UCL					1523
558	95% BCA Bootstrap UCL					1851						
559	90% Chebyshev(Mean, Sd) UCL					2013	95% Chebyshev(Mean, Sd) UCL					2588
560	97.5% Chebyshev(Mean, Sd) UCL					3387	99% Chebyshev(Mean, Sd) UCL					4956
561												
562	**Suggested UCL to Use**											
563	95% Chebyshev (Mean, Sd) UCL					2588						
564												
565	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
566	Recommendations are based upon data size, data distribution, and skewness.											
567	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
568	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
569												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/16/2019 10:12:49 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

F1

General Statistics

Total Number of Observations	31	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	30
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable F1 was not processed!

F2

General Statistics

Total Number of Observations	31	Number of Distinct Observations	10
Number of Detects	9	Number of Non-Detects	22
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	13	Minimum Non-Detect	10
Maximum Detect	28000	Maximum Non-Detect	10
Variance Detects	86009151	Percent Non-Detects	70.97%
Mean Detects	3278	SD Detects	9274
Median Detects	82	CV Detects	2.829
Skewness Detects	2.996	Kurtosis Detects	8.981
Mean of Logged Detects	5.075	SD of Logged Detects	2.315

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.41	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.495	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	958.8	KM Standard Error of Mean	940.9
KM SD	4939	95% KM (BCA) UCL	2775
95% KM (t) UCL	2556	95% KM (Percentile Bootstrap) UCL	2759
95% KM (z) UCL	2506	95% KM Bootstrap t UCL	74011
90% KM Chebyshev UCL	3782	95% KM Chebyshev UCL	5060
97.5% KM Chebyshev UCL	6835	99% KM Chebyshev UCL	10321

51												
52	**Gamma GOF Tests on Detected Observations Only**											
53					A-D Test Statistic	1.43	**Anderson-Darling GOF Test**					
54					5% A-D Critical Value	0.832	Detected Data Not Gamma Distributed at 5% Significance Level					
55					K-S Test Statistic	0.337	**Kolmogorov-Smirnov GOF**					
56					5% K-S Critical Value	0.306	Detected Data Not Gamma Distributed at 5% Significance Level					
57	**Detected Data Not Gamma Distributed at 5% Significance Level**											
58												
59	**Gamma Statistics on Detected Data Only**											
60					k hat (MLE)	0.237			k star (bias corrected MLE)	0.232		
61					Theta hat (MLE)	13819			Theta star (bias corrected MLE)	14117		
62					nu hat (MLE)	4.27			nu star (bias corrected)	4.18		
63					Mean (detects)	3278						
64												
65	**Gamma ROS Statistics using Imputed Non-Detects**											
66	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
67	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
68	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
69	This is especially true when the sample size is small.											
70	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
71					Minimum	0.01			Mean	951.7		
72					Maximum	28000			Median	0.01		
73					SD	5022			CV	5.277		
74					k hat (MLE)	0.0945			k star (bias corrected MLE)	0.107		
75					Theta hat (MLE)	10069			Theta star (bias corrected MLE)	8905		
76					nu hat (MLE)	5.86			nu star (bias corrected)	6.626		
77					Adjusted Level of Significance (β)	0.0413						
78					Approximate Chi Square Value (6.63, α)	1.968			Adjusted Chi Square Value (6.63, β)	1.83		
79					95% Gamma Approximate UCL (use when n>=50)	3205			95% Gamma Adjusted UCL (use when n<50)	3446		
80												
81	**Estimates of Gamma Parameters using KM Estimates**											
82					Mean (KM)	958.8			SD (KM)	4939		
83					Variance (KM)	24396331			SE of Mean (KM)	940.9		
84					k hat (KM)	0.0377			k star (KM)	0.0555		
85					nu hat (KM)	2.336			nu star (KM)	3.443		
86					theta hat (KM)	25445			theta star (KM)	17263		
87					80% gamma percentile (KM)	184.2			90% gamma percentile (KM)	1662		
88					95% gamma percentile (KM)	5272			99% gamma percentile (KM)	19985		
89												
90	**Gamma Kaplan-Meier (KM) Statistics**											
91					Approximate Chi Square Value (3.44, α)	0.515			Adjusted Chi Square Value (3.44, β)	0.46		
92					95% Gamma Approximate KM-UCL (use when n>=50)	6410			95% Gamma Adjusted KM-UCL (use when n<50)	7173		
93	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)											
94												
95	**Lognormal GOF Test on Detected Observations Only**											
96					Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**					
97					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level					
98					Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**					
99					5% Lilliefors Critical Value	0.274	Detected Data appear Lognormal at 5% Significance Level					
100	**Detected Data appear Lognormal at 5% Significance Level**											

101												
102	**Lognormal ROS Statistics Using Imputed Non-Detects**											
103					Mean in Original Scale	952.1				Mean in Log Scale	-1.075	
104					SD in Original Scale	5022				SD in Log Scale	5.105	
105					95% t UCL (assumes normality of ROS data)	2483				95% Percentile Bootstrap UCL	2744	
106					95% BCA Bootstrap UCL	3723				95% Bootstrap t UCL	70525	
107					95% H-UCL (Log ROS)	6.030E+8						
108												
109	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
110					KM Mean (logged)	3.108				KM Geo Mean	22.37	
111					KM SD (logged)	1.723				95% Critical H Value (KM-Log)	3.397	
112					KM Standard Error of Mean (logged)	0.328				95% H-UCL (KM -Log)	287	
113					KM SD (logged)	1.723				95% Critical H Value (KM-Log)	3.397	
114					KM Standard Error of Mean (logged)	0.328						
115												
116	**DL/2 Statistics**											
117					**DL/2 Normal**					**DL/2 Log-Transformed**		
118					Mean in Original Scale	955.2				Mean in Log Scale	2.616	
119					SD in Original Scale	5022				SD in Log Scale	1.997	
120					95% t UCL (Assumes normality)	2486				95% H-Stat UCL	402.2	
121	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
122												
123	**Nonparametric Distribution Free UCL Statistics**											
124	**Detected Data appear Lognormal Distributed at 5% Significance Level**											
125												
126	**Suggested UCL to Use**											
127					97.5% KM (Chebyshev) UCL	6835						
128												
129	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
130	Recommendations are based upon data size, data distribution, and skewness.											
131	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
132	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
133												
134	**F3**											
135												
136	**General Statistics**											
137					Total Number of Observations	31				Number of Distinct Observations	24	
138					Number of Detects	24				Number of Non-Detects	7	
139					Number of Distinct Detects	23				Number of Distinct Non-Detects	1	
140					Minimum Detect	17				Minimum Non-Detect	25	
141					Maximum Detect	30000				Maximum Non-Detect	25	
142					Variance Detects	48566899				Percent Non-Detects	22.58%	
143					Mean Detects	2554				SD Detects	6969	
144					Median Detects	130				CV Detects	2.729	
145					Skewness Detects	3.379				Kurtosis Detects	11.53	
146					Mean of Logged Detects	5.33				SD of Logged Detects	2.097	
147												
148	**Normal GOF Test on Detects Only**											
149					Shapiro Wilk Test Statistic	0.42				**Shapiro Wilk GOF Test**		
150					5% Shapiro Wilk Critical Value	0.916				Detected Data Not Normal at 5% Significance Level		

151					Lilliefors Test Statistic	0.432	**Lilliefors GOF Test**					
152					5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level					
153	**Detected Data Not Normal at 5% Significance Level**											
154												
155	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
156					KM Mean	1981				KM Standard Error of Mean	1118	
157					KM SD	6096				95% KM (BCA) UCL	4158	
158					95% KM (t) UCL	3879				95% KM (Percentile Bootstrap) UCL	3902	
159					95% KM (z) UCL	3821				95% KM Bootstrap t UCL	10013	
160					90% KM Chebyshev UCL	5336				95% KM Chebyshev UCL	6856	
161					97.5% KM Chebyshev UCL	8965				99% KM Chebyshev UCL	13109	
162												
163	**Gamma GOF Tests on Detected Observations Only**											
164					A-D Test Statistic	2.993	**Anderson-Darling GOF Test**					
165					5% A-D Critical Value	0.862	Detected Data Not Gamma Distributed at 5% Significance Level					
166					K-S Test Statistic	0.285	**Kolmogorov-Smirnov GOF**					
167					5% K-S Critical Value	0.194	Detected Data Not Gamma Distributed at 5% Significance Level					
168	**Detected Data Not Gamma Distributed at 5% Significance Level**											
169												
170	**Gamma Statistics on Detected Data Only**											
171					k hat (MLE)	0.278				k star (bias corrected MLE)	0.271	
172					Theta hat (MLE)	9198				Theta star (bias corrected MLE)	9433	
173					nu hat (MLE)	13.33				nu star (bias corrected)	12.99	
174					Mean (detects)	2554						
175												
176	**Gamma ROS Statistics using Imputed Non-Detects**											
177	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
178	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
179	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
180	This is especially true when the sample size is small.											
181	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
182					Minimum	0.01				Mean	1977	
183					Maximum	30000				Median	52	
184					SD	6198				CV	3.135	
185					k hat (MLE)	0.168				k star (bias corrected MLE)	0.173	
186					Theta hat (MLE)	11777				Theta star (bias corrected MLE)	11419	
187					nu hat (MLE)	10.41				nu star (bias corrected)	10.73	
188					Adjusted Level of Significance (β)	0.0413						
189					Approximate Chi Square Value (10.73, α)	4.406				Adjusted Chi Square Value (10.73, β)	4.182	
190					95% Gamma Approximate UCL (use when n>=50)	4817				95% Gamma Adjusted UCL (use when n<50)	5075	
191												
192	**Estimates of Gamma Parameters using KM Estimates**											
193					Mean (KM)	1981				SD (KM)	6096	
194					Variance (KM)	37157036				SE of Mean (KM)	1118	
195					k hat (KM)	0.106				k star (KM)	0.117	
196					nu hat (KM)	6.549				nu star (KM)	7.249	
197					theta hat (KM)	18755				theta star (KM)	16945	
198					80% gamma percentile (KM)	1686				90% gamma percentile (KM)	5572	
199					95% gamma percentile (KM)	11341				99% gamma percentile (KM)	29067	
200												

	A	B	C	D	E	F	G	H	I	J	K	L
201	**Gamma Kaplan-Meier (KM) Statistics**											
202	Approximate Chi Square Value (7.25, α)					2.308	Adjusted Chi Square Value (7.25, β)					2.156
203	95% Gamma Approximate KM-UCL (use when n>=50)					6222	95% Gamma Adjusted KM-UCL (use when n<50)					6661
204												
205	**Lognormal GOF Test on Detected Observations Only**											
206	Shapiro Wilk Test Statistic					0.874	**Shapiro Wilk GOF Test**					
207	5% Shapiro Wilk Critical Value					0.916	Detected Data Not Lognormal at 5% Significance Level					
208	Lilliefors Test Statistic					0.173	**Lilliefors GOF Test**					
209	5% Lilliefors Critical Value					0.177	Detected Data appear Lognormal at 5% Significance Level					
210	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
211												
212	**Lognormal ROS Statistics Using Imputed Non-Detects**											
213	Mean in Original Scale					1979	Mean in Log Scale					4.471
214	SD in Original Scale					6197	SD in Log Scale					2.491
215	95% t UCL (assumes normality of ROS data)					3868	95% Percentile Bootstrap UCL					4036
216	95% BCA Bootstrap UCL					4754	95% Bootstrap t UCL					10111
217	95% H-UCL (Log ROS)					15575						
218												
219	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
220	KM Mean (logged)					4.784	KM Geo Mean					119.6
221	KM SD (logged)					2.07	95% Critical H Value (KM-Log)					3.919
222	KM Standard Error of Mean (logged)					0.38	95% H-UCL (KM -Log)					4483
223	KM SD (logged)					2.07	95% Critical H Value (KM-Log)					3.919
224	KM Standard Error of Mean (logged)					0.38						
225												
226	**DL/2 Statistics**											
227	**DL/2 Normal**						**DL/2 Log-Transformed**					
228	Mean in Original Scale					1980	Mean in Log Scale					4.697
229	SD in Original Scale					6197	SD in Log Scale					2.189
230	95% t UCL (Assumes normality)					3869	95% H-Stat UCL					6202
231	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
232												
233	**Nonparametric Distribution Free UCL Statistics**											
234	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
235												
236	**Suggested UCL to Use**											
237	97.5% KM (Chebyshev) UCL					8965						
238												
239	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
240	Recommendations are based upon data size, data distribution, and skewness.											
241	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
242	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
243												

ERA Intake Parameters

Upper Site

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Meadow Vole		
Receptor Name	Meadow Vole	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	2	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	0	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.042	kg
Food intake rate	1.1E-02	kg wet-wt/day
Water intake rate	6.0E-03	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	4.8E-01	
Fraction of food intake rate	6.0E-02	
Ingestion rate	3.1E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	7.5E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	9.8E-01	
Ingestion rate	1.1E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	2.6E-01	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	2.0E-02	
Ingestion rate	2.2E-04	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	5.2E-03	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	6.0E-03	L/day
Fraction from site	1	
Intake factor (IFing-sw)	1.4E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Masked Shrew		
Receptor Name	Masked Shrew	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	2	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	0	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.005	kg
Food intake rate	3.0E-03	kg wet-wt/day
Water intake rate	1.0E-03	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	3.0E-01	
Fraction of food intake rate	4.9E-02	
Ingestion rate	4.4E-05	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	8.9E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	2.5E-02	
Ingestion rate	7.5E-05	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	1.5E-02	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	9.8E-01	
Ingestion rate	2.9E-03	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	5.9E-01	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	1.0E-03	L/day
Fraction from site	1	
Intake factor (IFing-sw)	2.0E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the Red-tailed Hawk		
Receptor Name	Red-tailed Hawk	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	1	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	1	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	1.1	kg
Food intake rate	1.9E-01	kg wet-wt/day
Water intake rate	6.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	3.3E-01	
Fraction of food intake rate	1.1E-02	
Ingestion rate	6.6E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	6.0E-04	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	0.0E+00	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	1.0E+00	
Ingestion rate	1.9E-01	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	1.7E-01	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	6.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	5.5E-02	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

Stantec's Ecological Risk Assessment Model (Version 6.0)

Intake Parameters for the American Robin		
Receptor Name	American Robin	
Name of Study Area	Border Beacon	
Entire Local Study Area or Project Alone	Baseline Case	
Does the OMOE 511/09 regulation apply to this site?	No	
Fraction of organic carbon in the soil	0.01	(unitless)
Fraction organic carbon in freshwater (dry) sediment	0.0706	(unitless, usual range is 0.003 to 0.03)
Fraction organic carbon in marine (dry) sediment	0.01	(unitless, usual range is 0.003 to 0.03)
Fraction lipid in freshwater invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Fraction lipid in marine invertebrates (wet weight)	0.017	(unitless, usual range is 0.012 to 0.025)
Soil Moisture Content	0.25	(cm^3/cm^3) or (ml/cm^3)
Soil Bulk Density	1.487	(g/cm^3)
Calculate TU based on	1	(1-top 5% most sensitive species, 2-Rainbow Trout, 3-Daphnia magna)
Receptor Type	1	(1-Bird, 2-Mammal)
Is Receptor Sensitive Species for the Project?	1	(1-Yes, 0-No)
Small Mammal Type	1	(1-General, 2-Herbivore, 3-Insectivore) Default value should be 1
Fish based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Benthic Invertebrates based on Sediment or Surface Water Uptake	1	(1-Freshwater Sediment, 2-Surface Water) Default value should be 1
Aquatic Plants based on Sediment or Surface Water Uptake	2	(1-Freshwater Sediment, 2-Surface Water) Default value should be 2
Fish based on Sediment or Seawater Uptake	2	(1-Marine Sediment, 2-Seawater) Default value should be 2
Marine Benthic Invertebrates based on Sediment or Seawater Uptake	1	(1-Marine Sediment, 2-Seawater) Default value should be 1
General Parameters		
Body weight	0.08	kg
Food intake rate	6.5E-02	kg wet-wt/day
Water intake rate	1.0E-02	L/day
Ingestion of Soil	0	
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction diet that is dry solid	2.6E-01	
Fraction of food intake rate	2.9E-02	
Ingestion rate	4.8E-04	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sl)	6.1E-03	kg/kg-day
Ingestion of Terrestrial Plants		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	5.2E-01	
Ingestion rate	3.4E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tp)	4.2E-01	kg/kg-day
Ingestion of Terrestrial Invertebrates		
Applicable pathway?	1	(0 = no, 1 = yes)
Fraction of food intake rate	4.8E-01	
Ingestion rate	3.1E-02	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ti)	3.9E-01	kg/kg-day
Ingestion of Terrestrial Mammals/Birds		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-tm)	0.0E+00	kg/kg-day
Ingestion of Surface Water		
Applicable pathway?	1	(0 = no, 1 = yes)
Ingestion rate	1.0E-02	L/day
Fraction from site	1	
Intake factor (IFing-sw)	1.3E-01	L/kg-day
Ingestion of Freshwater Sediment		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction diet that is dry solid	0.0E+00	
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg dry-wt/day
Fraction from site	1	
Intake factor (IFing-sed)	0.0E+00	kg/kg-day
Ingestion of Freshwater Aquatic Plants		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ap)	0.0E+00	kg/kg-day
Ingestion of Freshwater Benthic Invertebrates		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-ai)	0.0E+00	kg/kg-day
Ingestion of Freshwater Fish		
Applicable pathway?	0	(0 = no, 1 = yes)
Fraction of food intake rate	0.0E+00	
Ingestion rate	0.0E+00	kg wet-wt/day
Fraction from site	1	
Intake factor (IFing-fsh)	0.0E+00	kg/kg-day

ERA Results

Upper Site

Exposure Point Concentrations for Upper Site

Constituent	CAS-RN	Soil Conc. (mg/kg dw)	Terrestrial Plant Conc. (mg/kg ww)	Terrestrial Invertebrate Conc. (mg/kg ww)	Terrestrial Mammal Conc. (mg/kg ww)
TPH - CCME CWS	% Composition				
Aliph>C06-C08 - F1	0.55	1.9E+00	2.8E-01	1.8E-01	7.5E-03
Aliph>C08-C10 - F1	0.36	1.2E+00	2.3E-02	1.2E-01	1.2E-03
Arom>C08-C10 - F1	0.09	3.1E-01	9.3E-02	3.1E-02	1.8E-03
F1 - Total	1	3.4E+00	3.9E-01	3.3E-01	1.1E-02
Aliph>C10-C12 - F2	0.36	2.5E+03	3.0E+00	1.5E+02	3.9E-01
Aliph>C12-C16 - F2	0.44	3.0E+03	2.6E-01	1.5E+02	2.5E-01
Arom>C10-C12 - F2	0.09	6.2E+02	1.3E+02	3.8E+01	1.5E+00
Arom>C12-C16 - F2	0.11	7.5E+02	9.1E+01	4.6E+01	1.3E+00
F2 - Total	1	6.8E+03	2.3E+02	3.8E+02	3.5E+00
Aliph>C16-C21 - F3	0.56	5.0E+03	4.4E-01	2.4E+02	4.2E-01
Aliph>C21-C34 - F3	0.24	2.2E+03	1.9E-01	5.2E+01	9.1E-02
Arom>C16-C21 - F3	0.14	1.3E+03	5.0E+01	6.1E+01	8.3E-01
Arom>C21-C34 - F3	0.06	5.4E+02	1.8E+00	2.6E+01	8.8E-02
F3 - Total	1	9.0E+03	5.3E+01	3.8E+02	1.4E+00
Polycyclic Aromatic Hydrocarbons					
Low Molecular Weight PAHs					
Acenaphthene	83329	5.0E-03	3.6E-03	1.6E-04	1.8E-04
Acenaphthylene	208968	5.0E-03	3.6E-03	1.6E-04	1.9E-04
Anthracene	120127	1.0E-02	4.9E-03	3.3E-04	3.4E-04
Fluoranthene	206440	4.5E-02	9.8E-03	1.5E-03	8.0E-04
Fluorene	86737	2.0E-02	6.8E-03	6.5E-04	4.1E-04
1-Methylnaphthalene	90120	5.0E-03	3.6E-03	1.6E-04	1.8E-04
2-Methylnaphthalene	91576	1.8E-02	6.5E-03	5.9E-04	3.1E-04
Naphthalene	91203	5.0E-03	3.6E-03	1.7E-04	1.1E-04
Phenanthrene	85018	2.5E-02	7.5E-03	8.1E-04	5.2E-04
High Molecular Weight PAHs					
Benz(a)anthracene	56553	5.0E-03	1.8E-04	8.1E-05	1.7E-05
Benzo(a)pyrene	50328	5.0E-03	1.8E-04	4.1E-04	8.1E-05
Benzo(b)fluoranthene	205992	1.9E-02	6.4E-04	3.1E-04	5.6E-05
Benzo(g,h,i)perylene	191242	5.0E-03	1.8E-04	4.1E-04	6.7E-05
Benzo(j)fluoranthene	205823	5.0E-03	1.8E-04	4.1E-04	7.0E-05
Benzo(k)fluoranthene	207089	5.0E-03	1.8E-04	8.1E-05	1.6E-05
Chrysene	218019	1.4E-01	4.2E-03	2.3E-03	4.2E-04
Dibenz(a,h)anthracene	53703	5.0E-03	1.8E-04	4.1E-04	6.7E-05
Indeno(1,2,3-cd)pyrene	193395	5.0E-03	1.8E-04	4.1E-04	6.7E-05
Perylene	198550	5.0E-03	1.8E-04	4.1E-04	7.5E-05
Pyrene	129000	2.1E-01	6.2E-03	3.4E-03	5.9E-04
Inorganics					
Antimony	7440360	5.7E+01	2.6E-01	9.1E+00	2.8E-02
Boron	7440428	1.9E+02	8.5E+01	6.4E+00	9.1E+00
Cadmium	7440439	2.3E+01	5.2E-01	1.6E+01	9.6E-01
Chromium (Total)	7440473	8.3E+01	5.1E-01	4.1E+00	1.9E+00
Copper	7440508	1.7E+04	3.3E+01	9.0E+01	5.2E+01
Lead	7439921	5.9E+02	1.4E+00	2.2E+01	5.8E+00
Nickel	7440020	1.6E+02	7.3E-01	2.8E+01	2.7E+00
Selenium	7782492	2.4E+02	3.2E+01	3.8E+01	8.0E+00
Silver	7440224	1.5E+02	7.8E-01	4.9E+01	1.9E-01
Tin	7440315	1.5E+03	4.7E+00	4.7E+01	7.0E+01
Zinc	7440666	2.6E+03	5.7E+01	1.8E+02	5.0E+01

Detailed Baseline Case Hazard Quotients for the Meadow Vole Exposed to CoPCs at Upper Site Receptor Location

Detailed Baseline Case Hazard Quotients for the Meadow Vole Exposed to CoPCs at Upper Site Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS									
Aliph>C06-C08 - F1	5.0E+01	1.4E-02	2.8E-04	7.1E-02	1.4E-03	9.6E-04	1.9E-05	---	1.7E-03
Aliph>C08-C10 - F1	5.0E+01	9.2E-03	1.8E-04	5.9E-03	1.2E-04	6.3E-04	1.3E-05	---	3.1E-04
Arom>C08-C10 - F1	1.0E+02	2.3E-03	2.3E-05	2.4E-02	2.4E-04	1.6E-04	1.6E-06	---	2.6E-04
F1 - Total									2.3E-03
Aliph>C10-C12 - F2	2.5E+02	1.8E+01	7.4E-02	7.7E-01	3.1E-03	7.9E-01	3.1E-03	---	8.0E-02
Aliph>C12-C16 - F2	2.5E+02	2.3E+01	9.0E-02	6.8E-02	2.7E-04	7.7E-01	3.1E-03	---	9.3E-02
Arom>C10-C12 - F2	5.0E+01	4.6E+00	9.2E-02	3.4E+01	6.8E-01	2.0E-01	4.0E-03	---	7.8E-01
Arom>C12-C16 - F2	5.0E+01	5.6E+00	1.1E-01	2.3E+01	4.7E-01	2.4E-01	4.8E-03	---	5.9E-01
F2 - Total									**1.5E+00**
Aliph>C16-C21 - F3	1.0E+03	3.8E+01	3.8E-02	1.1E-01	1.1E-04	1.3E+00	1.3E-03	---	3.9E-02
Aliph>C21-C34 - F3	1.0E+03	1.6E+01	1.6E-02	4.9E-02	4.9E-05	2.7E-01	2.7E-04	---	1.6E-02
Arom>C16-C21 - F3	5.0E+01	9.4E+00	1.9E-01	1.3E+01	2.6E-01	3.2E-01	6.4E-03	---	4.5E-01
Arom>C21-C34 - F3	5.0E+01	4.0E+00	8.1E-02	4.5E-01	9.0E-03	1.4E-01	2.7E-03	---	9.2E-02
F3 - Total									6.0E-01
								Total TPH HQ =	**2.1E+00**
Polycyclic Aromatic Hydrocarbons									
Low Molecular Weight PAHs									
Acenaphthene	1.7E+02	3.7E-05	2.2E-07	9.3E-04	5.4E-06	8.6E-07	5.1E-09	---	5.7E-06
Acenaphthylene	1.7E+02	3.7E-05	2.2E-07	9.3E-04	5.4E-06	8.6E-07	5.0E-09	---	5.7E-06
Anthracene	1.7E+02	7.5E-05	4.4E-07	1.3E-03	7.5E-06	1.7E-06	1.0E-08	---	7.9E-06
Fluoranthene	1.7E+02	3.4E-04	2.0E-06	2.5E-03	1.5E-05	7.7E-06	4.5E-08	---	1.7E-05
Fluorene	1.7E+02	1.5E-04	8.8E-07	1.7E-03	1.0E-05	3.4E-06	2.0E-08	---	1.1E-05
1-Methylnaphthalene	1.7E+02	3.7E-05	2.2E-07	9.3E-04	5.4E-06	8.6E-07	5.1E-09	---	5.7E-06
2-Methylnaphthalene	1.7E+02	1.3E-04	7.9E-07	1.7E-03	9.7E-06	3.1E-06	1.8E-08	---	1.1E-05
Naphthalene	1.7E+02	3.7E-05	2.2E-07	9.3E-04	5.4E-06	8.9E-07	5.2E-09	---	5.7E-06
Phenanthrene	1.7E+02	1.9E-04	1.1E-06	1.9E-03	1.1E-05	4.3E-06	2.5E-08	---	1.2E-05
								TOTAL LPAH HQ =	8.2E-05
High Molecular Weight PAHs									
Benz(a)anthracene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	4.2E-07	2.4E-08	---	4.7E-06
Benzo(a)pyrene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Benzo(b)fluoranthene	1.8E+01	1.4E-04	7.9E-06	1.6E-04	9.1E-06	1.6E-06	9.0E-08	---	1.7E-05
Benzo(g,h,i)perylene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Benzo(j)fluoranthene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Benzo(k)fluoranthene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	4.2E-07	2.4E-08	---	4.7E-06
Chrysene	1.8E+01	1.0E-03	5.8E-05	1.1E-03	6.1E-05	1.2E-05	6.6E-07	---	1.2E-04
Dibenz(a,h)anthracene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Indeno(1,2,3-cd)pyrene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Perylene	1.8E+01	3.7E-05	2.1E-06	4.6E-05	2.6E-06	2.1E-06	1.2E-07	---	4.8E-06
Pyrene	1.8E+01	1.6E-03	8.7E-05	1.6E-03	8.9E-05	1.8E-05	9.9E-07	---	1.8E-04
								TOTAL HPAH HQ =	3.5E-04
								TOTAL PAH HQ =	4.3E-04
Inorganics									
Antimony	5.9E-01	4.3E-01	7.2E-01	6.7E-02	1.1E-01	4.8E-02	8.1E-02	---	9.2E-01
Boron	9.4E+01	1.4E+00	1.5E-02	2.2E+01	2.3E-01	3.3E-02	3.6E-04	---	2.5E-01
Cadmium	1.9E+00	1.7E-01	9.3E-02	1.3E-01	7.1E-02	8.4E-02	4.5E-02	---	2.1E-01
Chromium (Total)	2.4E+00	6.2E-01	2.6E-01	1.3E-01	5.5E-02	2.1E-02	8.9E-03	---	3.2E-01
Copper	3.1E+00	1.3E+02	4.1E+01	8.4E+00	2.7E+00	4.7E-01	1.5E-01	---	**4.4E+01**
Lead	4.1E+01	4.4E+00	1.1E-01	3.6E-01	8.9E-03	1.2E-01	2.8E-03	---	1.2E-01
Nickel	8.1E-01	1.2E+00	1.5E+00	1.9E-01	2.3E-01	1.4E-01	1.8E-01	---	**1.9E+00**
Selenium	3.3E-01	1.8E+00	5.4E+00	8.3E+00	2.5E+01	2.0E-01	6.0E-01	---	**3.1E+01**
Silver	2.0E+01	1.1E+00	5.6E-02	2.0E-01	1.0E-02	2.6E-01	1.3E-02	---	7.9E-02
Tin	4.4E+01	1.1E+01	2.6E-01	1.2E+00	2.7E-02	2.5E-01	5.6E-03	---	2.9E-01
Zinc	7.6E+01	1.9E+01	2.6E-01	1.5E+01	1.9E-01	9.4E-01	1.2E-02	---	4.6E-01

Detailed Baseline Case Hazard Quotients for the Masked Shrew Exposed to CoPCs at Upper Site Receptor Location

Detailed Baseline Case Hazard Quotients for the Masked Shrew Exposed to CoPCs at Upper Site Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS								
Aliph>C06-C08 - F1	5.0E+01	1.7E-02	3.3E-04	4.2E-03	8.3E-05	1.1E-01	2.2E-03	2.6E-03
Aliph>C08-C10 - F1	5.0E+01	1.1E-02	2.2E-04	3.4E-04	6.8E-06	7.0E-02	1.4E-03	1.6E-03
Arom>C08-C10 - F1	1.0E+02	2.7E-03	2.7E-05	1.4E-03	1.4E-05	1.8E-02	1.8E-04	2.2E-04
F1 - Total								4.4E-03
Aliph>C10-C12 - F2	2.5E+02	2.2E+01	8.7E-02	4.5E-02	1.8E-04	8.8E+01	3.5E-01	4.4E-01
Aliph>C12-C16 - F2	2.5E+02	2.7E+01	1.1E-01	4.0E-03	1.6E-05	8.6E+01	3.4E-01	4.5E-01
Arom>C10-C12 - F2	5.0E+01	5.5E+00	1.1E-01	2.0E+00	4.0E-02	2.2E+01	4.4E-01	5.9E-01
Arom>C12-C16 - F2	5.0E+01	6.7E+00	1.3E-01	1.4E+00	2.7E-02	2.7E+01	5.4E-01	7.0E-01
F2 - Total								**2.2E+00**
Aliph>C16-C21 - F3	1.0E+03	4.5E+01	4.5E-02	6.6E-03	6.6E-06	1.4E+02	1.4E-01	1.9E-01
Aliph>C21-C34 - F3	1.0E+03	1.9E+01	1.9E-02	2.8E-03	2.8E-06	3.1E+01	3.1E-02	5.0E-02
Arom>C16-C21 - F3	5.0E+01	1.1E+01	2.2E-01	7.5E-01	1.5E-02	3.6E+01	7.2E-01	9.6E-01
Arom>C21-C34 - F3	5.0E+01	4.8E+00	9.5E-02	2.6E-02	5.3E-04	1.5E+01	3.1E-01	4.0E-01
F3 - Total								**1.6E+00**
								3.8E+00
Polycyclic Aromatic Hydrocarbons								
Low Molecular Weight PAHs								
Acenaphthene	1.7E+02	4.4E-05	2.6E-07	5.4E-05	3.2E-07	9.6E-05	5.6E-07	1.1E-06
Acenaphthylene	1.7E+02	4.4E-05	2.6E-07	5.4E-05	3.2E-07	9.6E-05	5.6E-07	1.1E-06
Anthracene	1.7E+02	8.9E-05	5.2E-07	7.4E-05	4.4E-07	1.9E-04	1.1E-06	2.1E-06
Fluoranthene	1.7E+02	4.0E-04	2.3E-06	1.5E-04	8.6E-07	8.5E-04	5.0E-06	8.2E-06
Fluorene	1.7E+02	1.8E-04	1.0E-06	1.0E-04	6.0E-07	3.8E-04	2.2E-06	3.9E-06
1-Methylnaphthalene	1.7E+02	4.4E-05	2.6E-07	5.4E-05	3.2E-07	9.6E-05	5.6E-07	1.1E-06
2-Methylnaphthalene	1.7E+02	1.6E-04	9.4E-07	9.7E-05	5.7E-07	3.5E-04	2.0E-06	3.5E-06
Naphthalene	1.7E+02	4.4E-05	2.6E-07	5.4E-05	3.2E-07	9.9E-05	5.8E-07	1.2E-06
Phenanthrene	1.7E+02	2.2E-04	1.3E-06	1.1E-04	6.6E-07	4.8E-04	2.8E-06	4.8E-06
								2.7E-05
High Molecular Weight PAHs								
Benz(a)anthracene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	4.7E-05	2.6E-06	5.3E-06
Benzo(a)pyrene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Benzo(b)fluoranthene	1.8E+01	1.7E-04	9.4E-06	9.6E-06	5.3E-07	1.8E-04	1.0E-05	2.0E-05
Benzo(g,h,i)perylene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Benzo(j)fluoranthene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Benzo(k)fluoranthene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	4.7E-05	2.6E-06	5.3E-06
Chrysene	1.8E+01	1.2E-03	6.9E-05	6.4E-05	3.5E-06	1.3E-03	7.4E-05	1.5E-04
Dibenz(a,h)anthracene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Indeno(1,2,3-cd)pyrene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Perylene	1.8E+01	4.4E-05	2.5E-06	2.7E-06	1.5E-07	2.4E-04	1.3E-05	1.6E-05
Pyrene	1.8E+01	1.9E-03	1.0E-04	9.4E-05	5.2E-06	2.0E-03	1.1E-04	2.2E-04
								4.9E-04
								5.2E-04
Inorganics								
Antimony	5.9E-01	5.1E-01	8.5E-01	3.9E-03	6.6E-03	5.3E+00	9.0E+00	**9.9E+00**
Boron	9.4E+01	1.7E+00	1.8E-02	1.3E+00	1.4E-02	3.7E+00	4.0E-02	7.1E-02
Cadmium	1.9E+00	2.0E-01	1.1E-01	7.7E-03	4.2E-03	9.4E+00	5.0E+00	**5.2E+00**
Chromium (Total)	2.4E+00	7.4E-01	3.1E-01	7.7E-03	3.2E-03	2.4E+00	9.9E-01	**1.3E+00**
Copper	3.1E+00	1.5E+02	4.8E+01	4.9E-01	1.6E-01	5.3E+01	1.7E+01	**6.5E+01**
Lead	4.1E+01	5.2E+00	1.3E-01	2.1E-02	5.2E-04	1.3E+01	3.2E-01	4.4E-01
Nickel	8.1E-01	1.4E+00	1.8E+00	1.1E-02	1.4E-02	1.6E+01	2.0E+01	**2.2E+01**
Selenium	3.3E-01	2.1E+00	6.5E+00	4.8E-01	1.5E+00	2.2E+01	6.7E+01	**7.5E+01**
Silver	2.0E+01	1.3E+00	6.6E-02	1.2E-02	5.8E-04	2.9E+01	1.4E+00	**1.5E+00**
Tin	4.4E+01	1.3E+01	3.0E-01	7.0E-02	1.6E-03	2.8E+01	6.3E-01	9.3E-01
Zinc	7.6E+01	2.3E+01	3.0E-01	8.5E-01	1.1E-02	1.1E+02	1.4E+00	**1.7E+00**

Detailed Baseline Case Hazard Quotient **Detailed Baseline Case Hazard Quotients for the Red-tailed**

Detailed Baseline Case Hazard Quotients for the Red-tailed Hawk Exposed to CoPCs at Upper Site Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Mammal Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS							
Aliph>C06-C08 - F1	9.8E+00	1.1E-03	1.1E-04	1.3E-03	1.3E-04	---	2.5E-04
Aliph>C08-C10 - F1	9.8E+00	7.3E-04	7.5E-05	2.1E-04	2.1E-05	---	9.6E-05
Arom>C08-C10 - F1	2.0E+01	1.8E-04	9.4E-06	3.2E-04	1.6E-05	---	2.6E-05
F1 - Total							3.7E-04
Aliph>C10-C12 - F2	4.9E+01	1.5E+00	3.0E-02	6.7E-02	1.4E-03	---	3.2E-02
Aliph>C12-C16 - F2	4.9E+01	1.8E+00	3.7E-02	4.4E-02	9.0E-04	---	3.8E-02
Arom>C10-C12 - F2	9.8E+00	3.7E-01	3.8E-02	2.7E-01	2.7E-02	---	6.5E-02
Arom>C12-C16 - F2	9.8E+00	4.5E-01	4.6E-02	2.3E-01	2.4E-02	---	7.0E-02
F2 - Total							2.0E-01
Aliph>C16-C21 - F3	2.0E+02	3.0E+00	1.5E-02	7.3E-02	3.8E-04	---	1.6E-02
Aliph>C21-C34 - F3	2.0E+02	1.3E+00	6.6E-03	1.6E-02	8.0E-05	---	6.7E-03
Arom>C16-C21 - F3	9.8E+00	7.5E-01	7.7E-02	1.4E-01	1.5E-02	---	9.2E-02
Arom>C21-C34 - F3	9.8E+00	3.2E-01	3.3E-02	1.5E-02	1.6E-03	---	3.5E-02
F3 - Total							1.5E-01
						Total TPH HQ =	3.5E-01
Polycyclic Aromatic Hydrocarbons							
Low Molecular Weight PAHs							
Acenaphthene	--	3.0E-06	---	3.1E-05	---	---	---
Acenaphthylene	--	3.0E-06	---	3.3E-05	---	---	---
Anthracene	--	6.0E-06	---	5.9E-05	---	---	---
Fluoranthene	--	2.7E-05	---	1.4E-04	---	---	---
Fluorene	--	1.2E-05	---	7.1E-05	---	---	---
1-Methylnaphthalene	--	3.0E-06	---	3.0E-05	---	---	---
2-Methylnaphthalene	--	1.1E-05	---	5.4E-05	---	---	---
Naphthalene	--	3.0E-06	---	1.9E-05	---	---	---
Phenanthrene	--	1.5E-05	---	9.0E-05	---	---	---
						TOTAL LPAH HQ =	---
High Molecular Weight PAHs							
Benz(a)anthracene	--	3.0E-06	---	3.0E-06	---	---	---
Benzo(a)pyrene	--	3.0E-06	---	1.4E-05	---	---	---
Benzo(b)fluoranthene	--	1.1E-05	---	9.7E-06	---	---	---
Benzo(g,h,i)perylene	--	3.0E-06	---	1.2E-05	---	---	---
Benzo(j)fluoranthene	--	3.0E-06	---	1.2E-05	---	---	---
Benzo(k)fluoranthene	--	3.0E-06	---	2.7E-06	---	---	---
Chrysene	--	8.4E-05	---	7.2E-05	---	---	---
Dibenz(a,h)anthracene	--	3.0E-06	---	1.2E-05	---	---	---
Indeno(1,2,3-cd)pyrene	--	3.0E-06	---	1.2E-05	---	---	---
Perylene	--	3.0E-06	---	1.3E-05	---	---	---
Pyrene	--	1.3E-04	---	1.0E-04	---	---	---
						TOTAL HPAH HQ =	---
						TOTAL PAH HQ =	---
Inorganics							
Antimony	--	3.4E-02	---	4.8E-03	---	---	---
Boron	3.3E+01	1.1E-01	3.5E-03	1.6E+00	4.8E-02	---	5.2E-02
Cadmium	1.5E+00	1.4E-02	9.4E-03	1.7E-01	1.1E-01	---	1.2E-01
Chromium (Total)	2.7E+00	5.0E-02	1.9E-02	3.3E-01	1.2E-01	---	1.4E-01
Copper	1.9E+01	1.0E+01	5.5E-01	9.0E+00	4.9E-01	---	**1.0E+00**
Lead	1.1E+01	3.5E-01	3.2E-02	1.0E+00	9.2E-02	---	1.2E-01
Nickel	6.7E+00	9.8E-02	1.5E-02	4.6E-01	6.9E-02	---	8.4E-02
Selenium	3.3E-01	1.4E-01	4.4E-01	1.4E+00	4.3E+00	---	**4.7E+00**
Silver	2.0E+00	9.0E-02	4.5E-02	3.3E-02	1.7E-02	---	6.2E-02
Tin	--	9.0E-01	---	1.2E+01	---	---	---
Zinc	8.9E+01	1.6E+00	1.7E-02	8.6E+00	9.7E-02	---	1.1E-01

Detailed Baseline Case Hazard Quotients for the American Robin Exposed to CoPCs at Upper Site Receptor Location

Detailed Baseline Case Hazard Quotients for the American Robin Exposed to CoPCs at Upper Site Receptor Location

Constituent	Reference Toxicity Dose (mg/kg-day)	Average Daily Dose (mg/kg-day)	Surface Soil Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Plant Ingestion HQ	Average Daily Dose (mg/kg-day)	Terrestrial Invertebrate Ingestion HQ	Marine Fish Ingestion HQ	Total Hazard Quotient
TPH - CCME CWS									
Aliph>C06-C08 - F1	1.0E+01	1.1E-02	1.1E-03	1.2E-01	1.2E-02	7.1E-02	7.1E-03	---	2.0E-02
Aliph>C08-C10 - F1	1.0E+01	7.4E-03	7.4E-04	9.7E-03	9.7E-04	4.6E-02	4.6E-03	---	6.3E-03
Arom>C08-C10 - F1	2.0E+01	1.9E-03	9.3E-05	3.9E-02	2.0E-03	1.2E-02	5.9E-04	---	2.7E-03
F1 - Total									2.9E-02
Aliph>C10-C12 - F2	5.0E+01	1.5E+01	3.0E-01	1.3E+00	2.5E-02	5.8E+01	1.2E+00	---	**1.5E+00**
Aliph>C12-C16 - F2	5.0E+01	1.8E+01	3.6E-01	1.1E-01	2.2E-03	5.7E+01	1.1E+00	---	**1.5E+00**
Arom>C10-C12 - F2	1.0E+01	3.7E+00	3.7E-01	5.6E+01	5.6E+00	1.5E+01	1.5E+00	---	**7.5E+00**
Arom>C12-C16 - F2	1.0E+01	4.6E+00	4.6E-01	3.9E+01	3.9E+00	1.8E+01	1.8E+00	---	**6.1E+00**
F2 - Total									**1.7E+01**
Aliph>C16-C21 - F3	2.0E+02	3.0E+01	1.5E-01	1.9E-01	9.4E-04	9.5E+01	4.8E-01	---	6.3E-01
Aliph>C21-C34 - F3	2.0E+02	1.3E+01	6.5E-02	8.0E-02	4.0E-04	2.0E+01	1.0E-01	---	1.7E-01
Arom>C16-C21 - F3	1.0E+01	7.6E+00	7.6E-01	2.1E+01	2.1E+00	2.4E+01	2.4E+00	---	**5.3E+00**
Arom>C21-C34 - F3	1.0E+01	3.3E+00	3.3E-01	7.4E-01	7.4E-02	1.0E+01	1.0E+00	---	**1.4E+00**
F3 - Total									**7.5E+00**
								Total TPH HQ =	**2.4E+01**
Polycyclic Aromatic Hydrocarbons									
Low Molecular Weight PAHs									
Acenaphthene	--	3.0E-05	---	1.5E-03	---	6.4E-05	---	---	---
Acenaphthylene	--	3.0E-05	---	1.5E-03	---	6.3E-05	---	---	---
Anthracene	--	6.1E-05	---	2.1E-03	---	1.3E-04	---	---	---
Fluoranthene	--	2.7E-04	---	4.2E-03	---	5.7E-04	---	---	---
Fluorene	--	1.2E-04	---	2.9E-03	---	2.5E-04	---	---	---
1-Methylnaphthalene	--	3.0E-05	---	1.5E-03	---	6.4E-05	---	---	---
2-Methylnaphthalene	--	1.1E-04	---	2.7E-03	---	2.3E-04	---	---	---
Naphthalene	--	3.0E-05	---	1.5E-03	---	6.6E-05	---	---	---
Phenanthrene	--	1.5E-04	---	3.2E-03	---	3.2E-04	---	---	---
								TOTAL LPAH HQ =	---
High Molecular Weight PAHs									
Benz(a)anthracene	--	3.0E-05	---	7.7E-05	---	3.1E-05	---	---	---
Benzo(a)pyrene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Benzo(b)fluoranthene	--	1.2E-04	---	2.7E-04	---	1.2E-04	---	---	---
Benzo(g,h,i)perylene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Benzo(j)fluoranthene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Benzo(k)fluoranthene	--	3.0E-05	---	7.7E-05	---	3.1E-05	---	---	---
Chrysene	--	8.5E-04	---	1.8E-03	---	8.8E-04	---	---	---
Dibenz(a,h)anthracene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Indeno(1,2,3-cd)pyrene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Perylene	--	3.0E-05	---	7.7E-05	---	1.6E-04	---	---	---
Pyrene	--	1.3E-03	---	2.6E-03	---	1.3E-03	---	---	---
								TOTAL HPAH HQ =	---
								TOTAL PAH HQ =	---
Inorganics									
Antimony	--	3.5E-01	---	1.1E-01	---	3.5E+00	---	---	---
Boron	3.3E+01	1.2E+00	3.5E-02	3.6E+01	1.1E+00	2.5E+00	7.4E-02	---	**1.2E+00**
Cadmium	1.5E+00	1.4E-01	9.5E-02	2.2E-01	1.5E-01	6.2E+00	4.2E+00	---	**4.5E+00**
Chromium (Total)	2.7E+00	5.0E-01	1.9E-01	2.2E-01	8.1E-02	1.6E+00	5.9E-01	---	8.6E-01
Copper	1.9E+01	1.0E+02	5.6E+00	1.4E+01	7.5E-01	3.5E+01	1.9E+00	---	**8.2E+00**
Lead	1.1E+01	3.5E+00	3.3E-01	6.0E-01	5.5E-02	8.5E+00	7.8E-01	---	**1.2E+00**
Nickel	6.7E+00	9.9E-01	1.5E-01	3.1E-01	4.6E-02	1.1E+01	1.6E+00	---	**1.8E+00**
Selenium	3.3E-01	1.5E+00	4.4E+00	1.4E+01	4.1E+01	1.5E+01	4.4E+01	---	**9.0E+01**
Silver	2.2E+00	9.1E-01	4.0E-01	3.3E-01	1.5E-01	1.9E+01	8.5E+00	---	**9.0E+00**
Tin	--	9.1E+00	---	2.0E+00	---	1.8E+01	---	---	---
Zinc	8.9E+01	1.6E+01	1.8E-01	2.4E+01	2.7E-01	7.0E+01	7.8E-01	---	**1.2E+00**

APPENDIX J

NCSCS

Lower Site

CCME National Classification System for Contaminated Sites (2008) version 1.3
Summary of Site Conditions

Site:	Site will be identified by:	Site Common Name
Civic Address: *(or other description of location)*	Former US Military Mid Canada Line Radar Site 212, Border Beacon (Lower Site), Newfoundland and Labrador (NL)	
Site Common Name: *(if applicable)*	Border Beacon (Lower Site)	
Code identifier: *(e.g., FCSI 8-digit identifier)*	Not applicable	
Site Owner or Custodian: *(Organization and Contact Person)*	Government of Newfoundland and Labrador	
Legal description *or* metes and bounds:	See Drawing No. 121414998-EE-03 attached	
Approximate Site area:	Approximately 200 Hectares (Lower Site)	
Parcel Identifier(s) [PID]: *(or Parcel Identification Numbers [PIN] if untitled Crown land)*		
Centre of site: *(provide latitude/longitude or UTM coordinates)*	Latitude:_55_____ degrees __19____ min __57____ secs; Longitude:__63____ degrees __12____ min __27____ secs	
	UTM Coordinate: Northing _____ Easting _____	
Site Land Use:	Current:	Commercial
	Proposed:	Commercial
Site Plan	**To delineate the bounds of the Site a site plan MUST be attached. The plan must be drawn to scale indicating the boundaries in relation to well-defined reference points and/or legal descriptions. Delineation of the contamination should also be indicated on the site plan.**	
Provide a brief description of the Site:	The Border Beacon site is located to the east of the Labrador-Quebec border and is approximately 190 km west of Hopedale, 200 km northeast of Churchill Falls and 285 km northwest of Happy Valley-Goose Bay (refer to Drawing Nos. 121414998-EE-01 and EE-02, attached). The Border Beacon site covers a land area of approximately 200 hectares. The Border Beacon facility was operated by the U.S. Military as a radar site from 1958 to 1965. As little is documented about the site, it is assumed that the upper site was similar to other Mid Canada Line (MCL) stations of the same era and consisted of an operations building, 4 communication antennae towers linked by a cable trough and wood trestle, an emergency shelter, 9 aboveground storage tanks (ASTs) and a helicopter pad. A 1987 document noted that the buildings and towers were to be demolished and buried as part of a decommissioning program. The lower site consisted of an airstrip, a fuel storage facility, accommodations and a fuel pump house. Transport Canada occupied the site in 1965 until the 1970s as a weather station. In 1986, four buildings on the lower site to the northwest of the airstrip were sold to Mr. C.W. House of Goose Bay. From 1994 to 1999, DND operated a fuel cache along the south portion of the airstrip. In 1996, an inspection by the NL Government noted the airstrip, four site buildings, fuel cache, large drum disposal dump (Waste Disposal Site #1), landfill (Waste Disposal Site #2) and refuse/debris in open trenches to the east of the landfill (Waste Disposal Site #3). In 1998, the Province transferred five parcels of land to Environment Canada including the airstrip and a parcel of land approximately 90 m by 180 m located to the north of the airstrip. See Drawing Nos. 121414998-EE-01 to 121414998-EE-10 attached. The Lower Site is the subject of this NCSCS.	

CCME National Classification System for Contaminated Sites (2008) version 1.3
Summary of Site Conditions

Affected media and Contaminants of Potential Concern (COPC):	Soil: petroleum hydrocarbons, metals, polycyclic aromatic hydrocarbons (PAHs) Surface water: petroleum hydrocarbons, metals Sediment: petroleum hydrocarbons, PAHs Groundwater: petroleum hydrocarbons, metals, PAHs, polychlorinated biphenyls (PCBs)

Please fill in the "letter" that best describes the level of information available for the site being assessed:

Site Letter Grade **B**

If letter grade is F, do not continue, you must have a minimum of a Phase I Environmental Site Assessment or equivalent.

Scoring Completed By:	Paula Brennan/Kelly Johnson
Date Scoring Completed:	22-Feb-19

CCME National Classification System for Contaminated Sites (2008) version 1.3
Pre-Screening Checklist

Question	Response (yes / no)	Comment
1. Are **Radioactive material**, **Bacterial contamination** or **Biological hazards** likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2. Are there **no contamination exceedances** (known or suspected)? Determination of exceedances may be based on: 1) CCME environmental quality guidelines; 2) equivalent provincial guidelines/standards if no CCME guideline exists for a specific chemical in a relevant medium; or 3) toxicity benchmarks derived from the literature for chemicals not covered by CCME or provincial guidelines/standards; or 4) background concentration.	No	If yes (*i.e.*, there are no exceedances), do not proceed through the NCSCS.
3. Have **partial/incompleted or no environmental site investigations** been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4. Is there direct and significant evidence of **impacts to humans** at the site, or off-site due to migration of contaminants from the site?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated.
5. Is there direct and significant evidence of **impacts to ecological receptors** at the site, or off-site due to migration of contaminants from the site?	No	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are considered to be severe, the site may be categorized as Class 1, regardless of the numerical total NCSCS score. For the purpose of application of the NCSCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction.
6. Are there indicators of significant **adverse effects in the exposure zone** (*i.e.*, the zone in which receptors may come into contact with contaminants)? Some examples are as follows: -Hydrocarbon sheen or NAPL in the exposure zone -Severely stressed biota or devoid of biota; -Presence of material at ground surface or sediment with suspected high concentration of contaminants such as ore tailings, sandblasting grit, slag, and coal tar.	No	To answer "yes", two scenarios should be satisfied; (1) there has to be a high probability that receptors will be exposed to the contaminant source in the near future, and (2) the predicted impacts to ecological receptors after exposure must be significant (see question 5). A low probability of exposure resulting in significant impacts, or a high probability of exposure but with only low to moderate effects expected should not result in a Class 1 designation, neither would a low probability of exposure resulting in low-to-moderate effects. If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated.
7. Do measured concentrations of volatiles or unexploded ordnances represent an **explosion hazard**?	No	If yes, do not proceed through the NCSCS. Do not continue until the safety risks have been addressed. Consult your jurisdiction's occupational health and safety guidance or legislation on exposive hazards and measurement of lower explosive limits.

CCME National Classification System for Contaminated Sites (2008) version 1.3
Pre-Screening Checklist

Rationale for not proceeding with NCSCS
(document any assumptions, reports, or site-specific information to support selection of "Yes" in Pre-Screening checklist)

If none of the above applies, proceed with the NCSCS scoring.

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = does not have an exceedance or strongly suspected not to have an exceedance		Based on the results of sampling in 2017 and 2018, petroleum hydrocarbons, polycyclic aromatic hydrocarbon (PAH), polychlorinated biphenyl (PCB), and/or metal parameters have exceeded applicable provincial and/or CCME guidelines in soil, groundwater, sediment, and/or surface water (Stantec 2018; 2019).	The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline). Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at http://st-ts.ccme.ca/ For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes			
Yes No Do Not Know				
B. Groundwater	Yes			
Yes No Do Not Know				
C. Surface water	Yes			
Yes No Do Not Know				
D. Sediment	Yes			
Yes No Do Not Know				
"Known" -score	8			
"Potential" - score	---			
2. Chemical Hazard				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	High	The relative degree of chemical hazard for arsenic, cadmium, lead, nickel, and PCBs is high (Stantec 2018; 2019).	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site. The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) has been provided as a separate sheet in this file. *See Attached Reference Material for Contaminant Hazard Rankings.*	Hazard as defined in the revised NCSCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
High Medium Low Do Not Know				
"Known" -score	8			
"Potential" - score	---			

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
3. Contaminant Exceedance Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")? NAPL (mobile or immobile) High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know	High (>100x)	The ratio of a measured TPH concentration in sediment (i.e., 33,000 mg/kg) is greater than 100x the applicable guideline of 25 mg/kg (Atlantic RBCA Tier I ESL for Protection of Aquatic Life) (Stantec 2018; 2019).	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the *most conservative media-specific and land-use appropriate CCME* environmental quality guidelines. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines NAPL (LNAPL or DNAPL) = Contaminant is a non-aqueous phase liquid (*i.e.,* due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (*i.e.*, greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Any amount of NAPL should be scored, *i.e*. small amounts and sheens cannot be ignored. The presence of a NAPL (mobile or immoblie or regardless of amount) may be considered unnaceptable by some jurisidcations. If NAPL is present, consult jurisdiction on how to proceed with NCSCS. Other standards may include local background concentration or published toxicity benchmarks. Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria. Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (*i.e.*, CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8) because of its highly concentrated nature and potential for increase in the size of the impacted zone.
"Known" -score	6			
"Potential" - score	---			
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	>10 hectare (ha) or 5000 m3	Contaminated soil and sediment exceeding Tier I RBSLs, Tier I ESLs and/or CCME SQGs/WQGs on Site has not been delineated, but is estimated to be at least approximately 15,000 cubic metres (Stantec 2018; 2019).	Measure or estimate the area or quantity of total contamination (*i.e*, all contaminants known or strongly suspected to be present on the site). The "Area of Contamination" is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
"Known" -score	9			
"Potential" - score	---			

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	Yes	According to Examples of Persistent Substances as provided in attached Reference Materials, persistent chemicals (i.e., PCBs) were detected on site above applicable guidelines (Stantec, 2017; 2018).	Persistent chemicals, *e.g.,* PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air, (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days. Elements do not degrade, therefore treat any metal, metalloid, or halogen COPC as persistent.	*Examples of Persistent Substances are provided in attached Reference Materials*
Are there contaminants present that could cause damage to utilities and infrastructure, either now or in the future, given their location? Yes No Do Not Know	Yes	Contaminants such as petroleum hydrocarbons may be suspected to cause damage to utilities or infrastructure if the area is developed in the future (Stantec, 2018; 2019).	If answered Yes, in Rationale for Score column document the location and extent of the infrastructure that is/may be damaged, verify the mode of contact between contaminants of potential concern (COPCs) and infrastructure, list the specific COPCs that could cause damage, and note the expected effect on specific infrastructure.	Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.
How many different contaminant classes have representative CCME guideline exceedances? one two to four five or more Do Not Know	five or more	Identified contaminants in sediment, soil, groundwater, and/or surface water are volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, inorganic substances (metals), PCBs, and PAHs (Stantec, 2018; 2019).	For the purposes of the revised NCSCS, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	*Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.*

"Known" - Score	7
"Potential" - Score	---

Contaminant Characteristic Total

Raw Total Score- "Known"	38	
Raw Total Score- "Potential"	---	
Raw Combined Total Score (Known + Potential)	38	
Adjusted Total Score (Raw Combined / 40 * 33)	**31.4**	maximum 33

CCME National Classification System (2008) version 1.3

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.				
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	12	The site is considered a non-potable site. Concentrations of TPH, PAHs, metals, and PCBs exceed at least 1x the applicable non-potable guidelines (Stantec 2018; 2019).	Review chemical data and evaluate groundwater quality. The evaluation method concentrates on 1) a potable or non-potable groundwater environment; 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking water quality. The aquifer can currently be used as a potable water supply or could have the potential for use in the future. Non-potable groundwater environments are defined as areas that are serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis. Physical evidence includes significant sheens, liquid phase contamination, or contaminant saturated soils. Seeps and springs are considered part of the groundwater pathway. In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries. Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links. Note that for potable groundwater that also daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality: http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php Non-Potable Environments CCME. 1999. Canadian Water Quality Guidelines for Protection of Aquatic Life. http://ceqg-rcqe.ccme.ca/ Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	9			
iii) Meets GCDWQ for potable environments; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for non-potable environments or Absence of groundwater exposure pathway (*i.e.,* there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Known COPC Exceedances, then you should skip Part B (Potential for groundwater pathway) and go to Section 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative mobility of contaminant High Moderate Low Insignificant Do Not Know		Skip B if A is complete.	Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (*i.e.,* log Koc < 2.7) — pH < 5 — pH > 8.5 Koc = 500 to 5000 (*i.e.,* log Koc = 2.7 to 3.7) — pH = 5 to 6 — pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (*i.e.,* log Koc = 3.7 to 5) — pH > 6 — pH < 7.5 Koc > 100,000 (*i.e.,* log Koc > 5) For PHC fractions; score F1 as Moderate, F2 as Low, and F3 and F4 as Insignificant.	Reference: US EPA Soil Screening Guidance (Part 5 - Table 39) If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
	Do Not Know			
Score	2			
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know		Skip B if A is complete.	Review the existing engineered systems or natural attenuation processes for the site and determine if full or partial containment is achieved. Full containment is defined as an engineered system or natural attenuation processes, monitored as being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for “Full Containment” scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128.
	Do Not Know			
Score	1.5			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
c. Thickness of confining layer over aquifer of concern or groundwater exposure pathway 3 m or less including no confining layer or discontinuous confining layer 3 to 10 m > 10 m Do Not Know Score	Do Not Know 0.5	Skip B if A is complete.	The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (*e.g.,* water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
d. Hydraulic conductivity of confining layer >10^{-4} cm/s or no confining layer 10^{-4} to 10^{-6} cm/s <10^{-6} cm/s Do Not Know Score	Do Not Know 0.5	Skip B if A is complete.	Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity ("K") of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability ("k") of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High (infiltration score > 0.6) Moderate (0.4 < infiltration score ≤ 0.6) Low (0.2 < infiltration score ≤ 0.4) Very Low (0 < infiltration score ≤ 0.2) None (infiltration score = 0) Do Not Know Score	Do Not Know 0.4	Skip B if A is complete.	<u>Precipitation</u> Refer to Environment Canada precipitation records for relevant areas (30 year average preferred). Divide annual precipitation (rainfall + snowfall) by 1000 and round to nearest tenth (*e.g.,* 667 mm = 0.7 score). <u>Permeability</u> For surface soil relative permeability (*i.e.*, infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0). Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate (*e.g.,* precipitation factor of 0.7 from above x 0.6 (sand) = 0.42 or "Moderate").	Selected Sources: Environment Canada web page link: http://climate.weather.gc.ca/climate_normals/index_e.html Snow to rainfall conversion apply ratio of 10(snow):1(water) https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=108C6C74-1
f. Hydraulic conductivity of aquifer >10^{-2} cm/s 10^{-2} to 10^{-4} cm/s <10^{-4} cm/s Do Not Know Score	Do Not Know 1	Skip B if A is complete.	Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
Potential groundwater pathway total	5.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Groundwater pathway total	**12**			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCME CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (*e.g.,* toxicity testing; or other indicator testing of exposure).	12	Concentrations of metals exceed the CCME CWQGs (Stantec, 2018; 2019).	Collect all available information on quality of surface water near to site. Evaluate available data against Canadian Water Quality Guidelines (select appropriate guidelines based on local water use, *e.g.,* recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigation, livestock watering, aquatic life.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References: CCME. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life http://ceqg-rcqe.ccme.ca/ CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) http://ceqg-rcqe.ccme.ca/ Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality. http://www.hc-sc.gc.ca/ewh-semt/water-eau/recreat/index-eng.php
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	8		Examples of indirect evidence may include observed staining of sediment and/or river banks, but surface water has not been tested.	
iii) Meets CWQG or absence of surface water exposure pathway (*e.g.,* Distance to nearest surface water is > 5 km.)	0			
Score	12 12			
NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you should skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)				
B. Potential for migration of COPCs in surface water				
a. Presence of containment No containment Partial containment Full containment Do Not Know	Do Not Know	Skip B if A is complete.	Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers between the site and nearby surface water. Full containment must include containment of all chemicals.	
Score	3			
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know	Do Not Know	Skip B if A is complete.	Review available mapping and survey data to determine distance to nearest surface water bodies.	
Score	2			
c. Topography Contaminants above ground level and slope is steep Contaminants at or below ground level and slope is steep Contaminants above ground level and slope is intermediate Contaminants at or below ground level and slope is intermediate Contaminants above ground level and slope is flat Contaminants at or below ground level and slope is flat Do Not Know	Do Not Know	Skip B if A is complete.	Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (*e.g.,* trench, above ground, etc.).	
Score	1			
d. Run-off potential High (run-off score > 0.6) Moderate (0.4 < run-off score ≤ 0.6) Low (0.2 < run-off score ≤ 0.4) Very Low (0 < run-off score ≤ 0.2) None (run-off score = 0) Do Not Know	Do Not Know	Skip B if A is complete.	Precipitation Refer to Environment Canada precipitation records for relevant areas (30 year average preferred). Divide precipitation (rainfall + snowfall) by 1000 and round to nearest tenth (*e.g.*, 667 mm = 0.7 score). Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the permeability (infiltration) factor with precipitation factor to obtain Run-off potential score (*e.g.*, precipitation factor of 0.7 from above x 0.6 (loam) = 0.42 or "Moderate").	Selected Sources: Environment Canada web page link: http://climate.weather.gc.ca/climate_normals/index_e.html Snow to rainfall conversion apply ratio of 10(snow):1(water) https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=108C6C74-1
Score	0.4			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
e. Flood potential 1 in 2 years 1 in 10 years 1 in 50 years not in floodplain Do Not Know	Do Not Know	Skip B if A is complete.	Review published data such as flood plain mapping or flood potential (*e.g.,* spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Score	0.5			
Potential surface water pathway total	6.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**12**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline. Strongly suspected that soils exceed guidelines. COPCs in surface soils does not exceed the CCME soil quality guideline or is not present (i.e., bedrock).	12 9 0	Identified contaminants in surface soils exceeding CCME soil quality guidelines are petroleum hydrocarbons, inorganic substances (metals) and PAHs (Stantec, 2018; 2019).	Collect all available information on quality of surface soils (*i.e.,* top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (*i.e,* agricultural, residential/parkland, commercial, or industrial), and soil texture if applicable (*i.e.,* coarse or fine). Examples of strongly suspected exceedences of soil guidelines may include evidence of staining, odours, or significant debris infill materials.	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. http://ceqg-rcqe.ccme.ca/
	12			
Score	12			
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you should skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
a. Are the soils in question covered? Exposed Vegetated Landscaped Paved Do Not Know	Do Not Know	Skip B if A is complete.	Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NCSCS as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
Score	4			
b. For what proportion of the year does the site remain covered by snow? 0 to 10% of the year 10 to 30% of the year More than 30% of the year Do Not Know	Do Not Know	Skip B if A is complete.	Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).	
Score	3			
Potential surface soil pathway total	7			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Soil pathway total	**12**			
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations. Strongly suspected (based on observations and/or modelling) Vapour has not been measured (i.e. not detected) and volatile hydrocarbons have not been found in site soils or groundwater, or vapour has been measured (indoor or outdoor) in concentrations not exceeding risk based concentrations.	12 9 0	Go to potential.	Consult previous investigations, including human health risk assessments, for reports of vapours detected. Due to the potential for significant spatial and temporal variation in soil vapour concentrations, limited vapour monitoring studies (*e.g.,* single point in time "snap-shot") that do not detect vapour at sites where volatiles are suspected, does not necessarily mean that vapours are not an issue at the site. In this case, section B " Potential for COPCs in vapour" should be completed.	
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you should skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)				

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H' (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3) Low (H' < 1.0E-3) Not Volatile Do Not Know	Moderate	According to the attached Reference Materials, petroleum hydrocarbons (F2) are considered to have moderate volatility (Stantec, 2018; 2019).	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36) *Provided in Attached Reference Materials* For PHC fractions; score F1 as High, F2 as Moderate, and F3 and F4 as Not Volatile. Substance is considered Not Volatile (*i.e.*, pathway not a concern) if the product of the water solubility and unitless Henry's law constant does not exceed published or derived tolerable concentration or risk-specific concentration. If NAPL is present, see Appendix D of the CCME soil vapour quality guideline protocol (CCME 2014) for further guidance.	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5. Selected References: CCME. 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours. Winnipeg, Manitoba. http://ceqg-rcqe.ccme.ca
Score	2.5			
b. What is the soil grain size? Fine Coarse Do Not Know	Coarse	The soil grain size is considered to be coarse (Stantec, 2018; 2019).	Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know	Yes	The depth to source is less than 10 m (Stantec, 2018; 2019).	Review groundwater depths below grade for the site.	
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know	Yes	The bedrock on the site is considered to be fractured (Stantec, 2018; 2019).	Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathyways.	Preferential pathways refer to areas where vapour migration is more likely to occur because there is lower resistance to flow than in the surrounding materials. For example, underground conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
Score	2			
Potential vapour pathway total	10.5			
Allowed Potential score	10.5	Note: If a "known" score is provided, the "potential" score is disallowed.		
Vapour pathway total	**10.5**			
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12	Go to potential.	Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in this area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future. or Sediment meets CCME sediment quality guidelines or absence of sediment exposure pathway (*i.e.,* within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you should skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)				

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(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")?	No	Sediments are not capped. Sediments in shallow water are not considered to be likely affected by tidal action, wave action or propeller wash. The sediments are not considered to be in an area prone to sediment scouring (Stantec, 2018; 2019).	Review existing sediment assessments. If sediment coring has been completed, it may indicate that historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
Yes				
No				
Do Not Know	4			
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash?	No		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
Yes				
No				
Do Not Know	0			
c. For rivers, are the contaminated sediments in an area prone to sediment scouring?	No		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional may become scoured. If the sediments present at the site are in a lake or marine habitat, select "no" for this question.	
Yes				
No				
Do Not Know	0			
Potential sediment pathway total	4			
Allowed Potential score	4	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**4**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected by contamination?	Yes	There are at least three separate dump sites. The buried debris and materials could act as conduits for contaminant migration (Stantec, 2018; 2019).	Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Yes				
No				
Do Not Know				
Known	4			
Potential	---			

Migration Potential Total

Raw Total Score- "Known"	40	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore,
Raw Total Score- "Potential"	14.5	the total "Potential" Score may not reflect the sum of the individual "Potential" scores.
Raw Combined Total Score (Known + Potential)	54.5	
Adjusted Total Score (Raw Combined / 64 * 33)	**28.1**	maximum 33

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(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Human				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site. (Class 1 Site*)	22	Based on the human health risk assessment, adverse effects to humans exposed to COPC at the site are considered unikely (Stantec, 2019).	*Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (*i.e.,* action required). Known impacts could include blood test results (*e.g.,* blood lead > 10 µg/dL) or results of other health based studies and tests. There is no need to proceed through the NCSCS in this case. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired. A score of 22 can also be assigned when Hazard Quotients (or Hazard Index) >> 1.0 or incremental lifetime cancer risks considerably exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals. The category, "Strongly suspected", can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients (or Hazard Index) > 0.2 (excluding the Estimated Daily Intake) or > 1.0 with Estimated Daily Intake and/or incremental lifetime cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{-5}$ or $>10^{-6}$). The category, no exposure/impacts, can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients (or Hazard Index) of ≤ 0.2 (excluding the Estimated Daily Intake) or ≤ 1.0 with Estimated Daily Intake AND incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{-6} or 10^{-5}).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments, available at http://www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index-eng.php United States Environmental Protection Agency, Integrated Risk Information System (IRIS), available at http://toxnet.nlm.nih.gov
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	10			
No quantified or suspected exposures/impacts in humans.	0			
	0			
Score	0			
NOTE: If a score is assigned here for Known Exposure, then you should skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know	Do Not Know	Skip B if A is complete.	Review zoning and land use maps over the distances indicated. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place. Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (*e.g.,* greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Parkland includes campgrounds, but excludes wildlands such as national or provincial parks. Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of more sensitive human receptors (*e.g.,* children).
Score	1.5			
b) Indicate the level of accessibility to the contaminated portion of the site (*e.g.,* the potential for coming in contact with contamination) Limited barriers to prevent site access; contamination not covered Moderate access or no intervening barriers, contaminants are covered. Remote locations in which contaminants not covered. Controlled access or remote location and contaminants are covered Do Not Know	Do Not Know	Skip B if A is complete.	Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	
Score	1			
B. Potential for human exposure				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential). i) direct contact Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated? Yes No Do Not Know	Do Not Know	Skip B if A is complete.	If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
Score	1.5			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
ii) inhalation (*i.e.,* inhalation of dust, vapour)		Skip B if A is complete.		Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion.
Vapour - Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet II (Migration Potential)?			If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a), *Potential for COPCs in Vapour* for a definition of volatility.	Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts.
Yes				
No				General Notes;
Do Not Know	Do Not Know			Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Score	1.5			
Dust - If there is contaminated surface soil (*e.g.,* top 1.5 m) , indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero.		Skip B if A is complete.	Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	Selected References;
Fine				Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332. http://ceqg-rcqe.ccme.ca/
Coarse				Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC
Surface soil is not contaminated or absent (bedrock)				
Do Not Know Texture				
	Do Not Know			
Score	2			
inhalation total	3.5			
B. Potential for human exposure				
iii) Ingestion (*i.e.,* ingestion of food items, water and soils [for children]), including traditional foods.		Skip B if A is complete.	Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (*e.g.,* provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure.	**Selected References:** Guidelines for Canadian Drinking Water Quality: http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php
Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future).			The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable.
0 to 100 m			For aquifers, examples of "No drinking water present" includes municipal bylaws prohibiting water wells for potable water use and naturally non-potable (*e.g.,* saline) shallow groundwater.	Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
100 to 300 m				
300 m to 1 km				
1 to 5 km				
No drinking water present				
No potential for aquifer contamination			Groundwater used for drinking water may not be at risk from contamination due to a lack of hydrological connection between contaminated soil or groundwater, or the drinking water is sufficiently up-gradient of the contamination source. Selection of "No potential for aquifer contamination" must be supported with sufficient documentation, *e.g.,* lithological and contaminant properties, well capture zones (map drawn to scale), and capture zone delineation methodology.	
Do Not Know				
	Do Not Know			
Score	2			
Is an alternative water supply readily available?		Skip B if A is complete.	Answer Not Applicable if "No drinking water present" or "No potential for aquifer contamination" was selected in previous question.	
Yes				
No				
Not Applicable				
Do Not Know	Do Not Know			
Score	0.5			
Is human ingestion of contaminated soils possible?		Skip B if A is complete.	If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Yes				
No				
Do Not Know	Do Not Know			
Score	1.5			
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings?		Skip B if A is complete.	Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (*e.g.,* large mammals may spend a very small amount of time at a small contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Ingestion total	4.5			
Human Health Total "Potential" Score	12	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	---			

CCME National Classification System (2008) version 1.3

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (*i.e.,* food, water, shelter, etc.) in contaminated area. Yes No Do Not Know	No			
Human Exposure Modifying Factors - "Known"	0			
Human Exposure Modifying Factors - "Potential"	---			
Raw Human "Known" total	0			
Raw Human "Potential" total	---			
Raw Combined Total Human Score	0			
Adjusted Total Human Score (max 22)	**0**			
3. Ecological				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to terrestrial or aquatic organisms as a result of the contaminated site.	18	Based on the ecological risk assessment, adverse effects to ecological receptors exposed to COPCs at the site are considered unlikely (Stantec, 2019).	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (*i.e.,* a priority for remediation or risk management), regardless of the numerical total NCS score. For the purpose of application of the NCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction. If ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provided in case a numerical score for the site is still desired.	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life. CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses. http://ceqg-rcqe.ccme.ca/ Sensitive receptors- review: Canadian Council on Ecological Areas; www.ccea.org Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight of evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
	0			
Score	0			
NOTE: If a score is assigned here for Known Exposure, then you should skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)				
B. Potential for ecological exposure (for the contaminated portion of the site)				
a) Terrestrial i) Land use Agricultural (or Wild lands) Residential / Parkland Commercial Industrial Do Not Know		Skip B if A is complete.	Review zoning and land use maps. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration). Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (*e.g.,* greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
	Do Not Know			
Score	1.5			
ii) Uptake potential Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site? Yes No Do Not Know		Skip B if A is complete.	If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.	
	Do Not Know			
Score	0.5			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
iii) Ingestion (*i.e.,* wildlife or domestic animals ingesting contaminated food items, soils or water)		Skip B if A is complete.		
Are terrestrial animals likely to be ingesting contaminated water at the site?			Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Are terrestrial animals likely to be ingesting contaminated soils at the site?			Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Can the contamination identified bioaccumulate?			Substances can be considered bioaccumulative if; • There is a Tissue Residue Guideline (TRG) or Soil Quality Guideline for Soil and Food Ingestion for the protection of secondary (SQG_{2C}) and/or tertiary consumers (SQG_{3C}). • Bioaccumulation factor (BAF) or bioconcentration factor (BCF) greater than 5000. • If BAF or BCF is not available, or reliable, the log Kow is equal to or greater than 5. If a literature review indicates that a substance biomagnifies, it should be treated as biomagnifying regardless of whether or not it meets the criteria above. It should also be noted that some substances with a log Kow greater than 5 do not biomagnify. If studies on a substance with a high Kow demonstrate a lack of biomagnification in upper trophic levels, then the substance can be considered not bioaccumulative. Petroleum hydrocarbons F1 to F4 are not considered bioaccumulative.	*See attached Reference Material including log(Kow)* Consult *CEPA (1999) Persistence and Bioaccumulation Regulations* for additional guidance; http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-107/page-1.html
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Distance to sensitive terrestrial ecological area			It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.
0 to 300 m				
300 m to 1 km				
1 to 5 km				
> 5 km				
Do Not Know				
	Do Not Know			
Score	1.5			
Raw Terrestrial "Potential" total	5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial "Potential" total	---			
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic		Skip B if A is complete.	"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species. "Typical aquatic environments" include those in areas other than those listed above.	
i) Classification of aquatic environment				
Sensitive				
Typical				
Not Applicable (no aquatic environment present)				
Do Not Know				
	Do Not Know			
Score	2			

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(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
ii) Uptake potential Does groundwater daylighting to an aquatic environment exceed the CCME water quality guidelines for the protection of aquatic life at the point of contact? Yes No (or Not Applicable) Do Not Know	Do Not Know	Skip B if A is complete.	Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "peepers", in the sediments in the area of daylighting groundwater.	
Score	0.5			
Distance from the contaminated site to an important surface water resource 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know	Do Not Know	Skip B if A is complete.	It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subject to further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments.
Score	1.5			
Are aquatic species (*i.e.,* forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as mammals and birds, likely to accumulate contaminants in their tissues? Yes No Do Not Know	Do Not Know	Skip B if A is complete.	Substances can be considered bioaccumulative if; • There is a Tissue Residue Guideline (TRG) • Bioaccumulation factor (BAF) or bioconcentration factor (BCF) greater than 5000. • If BAF or BCF is not available, or reliable, the log Kow is equal to or greater than 5. If a literature review indicates that a substance biomagnifies, it should be treated as biomagnifying regardless of whether or not it meets the criteria above. It should also be noted that some substances with a log Kow greater than 5 do not biomagnify. If studies on a substance with a high Kow demonstrate a lack of biomagnification in upper trophic levels, then the substance can be considered not bioaccumulative.	*See attached Reference Material including log(Kow)* Consult *CEPA (1999) Persistence and Bioaccumulation Regulations* for additional guidance; http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-107/page-1.html
Score	0.5			
Raw Aquatic "Potential" total	4.5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic "Potential" total	---			
4. Ecological Exposure Modifying Factors				
a) Known, or potential, occurrence of a species at risk. Is there a potential for a species at risk to be present at the site, or a known presence? Yes No Do Not Know	No 0 ---	An on-line search was conducted in 2018 and a biologist was consulted. It is considered unlikely that species at risk would be present at the site (Stantec, 2018; 2019).	Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as NatureServe Explorer (http://explorer.natureserve.org/). Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance. To assess the potential for a species at risk to be present, the site (or surroundings) should be located within range of a species at risk (using on-line resources and consultation with knowledgeable government departments or biologists, see above), and there should be an assessment of habitat suitability for any identified potential species at risk.	Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act, available at: http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1 Many provincial governments may also provide regionally applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection. http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Lower Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
b) Potential impact of aesthetics (*e.g.,* enrichment of a lake or tainting of food flavour).		There's potential staining around some of the smaller water bodies downgradient of some of the waste dumps (Stantec, 2018; 2019). There is visible metal debris in and around the water bodies.		
Is there evidence of aesthetic impact to receiving water bodies?	Yes		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	This Item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
Yes	2			
No				
Do Not Know	---			
Is there evidence of olfactory impact (*i.e.,* unpleasant smell)?	No	There's been no known reported evidence of olfactory impact (Stantec, 2018; 2019).	Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Yes	0			
No				
Do Not Know	---			
Is there evidence of increase in plant growth in the lake or water body?	No	There's been no known reported evidence of increase in plant growth in the lake or water body (Stantec, 2018; 2019).	A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients *e.g.,* nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.	
Yes	0			
No				
Do Not Know	---			
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different?	No	There's been no known reported evidence that fish or meat taken from or adjacent to the site smells or tastes different (Stantec, 2018; 2019).	Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Yes	0			
No				
Do Not Know	---			
Ecological Modifying Factors Total - Known	2			
Ecological Modifying Factors Total - Potential	---			
Raw Ecological "Known" total	2			
Raw Ecological "Potential" total	---			
Raw Combined Total Ecological Score	2			
Adjusted Total Ecological Score (Max 18)	**2**			
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)		Discontinuous permafrost (i.e., between 30% and 80% of the ground surface) may be present at the site (Stantec, 2018; 2019). No roads or buildings are suspected to be dependant upon the permafrost for structural integrity.		Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summer. Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	No		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability of the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.	
Yes	0			
No				
Do Not Know	---			
		It is unknown if there is a physical pathway that could transport soils released by damaged permafrost to a nearby aquatic environment (Stantec, 2018; 2019).		
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	Do Not Know		Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	
Yes	---			
No				
Do Not Know	1			
Other Potential Receptors Total - Known	0			
Other Potential Receptors Total - Potential	1			

Exposure Total		
Raw Human Health + Ecological Total + Other Receptors - "Known"	2	
Raw Human Health + Ecological Total + Other Receptors - "Potential"	1	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.
Raw Total Exposure Score (not adjusted)	3	HH or Eco Total score has not yet been capped at 22 and 18, respectively.
Adjusted Total Score (Adjusted Total Exposure / 46 * 34)	**2.2**	maximum 34

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Score Summary

Site: Border Beacon (Lower Site)

Scores from individual worksheets are tallied in this worksheet.
Refer to this sheet after filling out the revised NCSCS completely.

I. Contaminant Characteristics	Known	Potential
1. Residency Media	8	---
2. Chemical Hazard	8	---
3. Contaminant Exceedance Factor	6	---
4. Contaminant Quantity	9	---
5. Modifying Factors	7	---
Raw Total Score	38	---
Raw Combined Total Score (Known + Potential)	38	
Adjusted Total Score (Raw Combined Total/40*33)	**31.4**	(max 33)

II. Migration Potential	Known	Potential
1. Groundwater Movement	12	---
2. Surface Water Movement	12	---
3. Soil	12	---
4. Vapour	---	10.5
5. Sediment Movement	---	4
6. Modifying Factors	4	---
Raw Total Score	40	14.5
Raw Combined Total Score (Known + Potential)	54.5	
Adjusted Total Score (Raw Combined Total/64*33)	**28.1**	(max 33)

III. Exposure	Known	Potential
1. Human Receptors		
A. Known Impact	0	
B Potential		
a. Land Use		---
b. Accessibility		---
c. Exposure Route		
i. Direct Contact		---
ii. Inhalation		---
iii. Ingestion		---
2. Human Receptors Modifying Factors	0	---
Raw Total Human Score	0	---
Raw Combined Total Human Score (Known + Potential)	0	
Adjusted Total Human Score	0	(maximum 22)
3. Ecological Receptors		
A. Known Impact	0	
B. Potential		
a. Terrestrial		---
b. Aquatic		---
4. Ecological Receptors Modifying Factors	2	---
Raw Total Ecological Score	2	---
Raw Combined Total Ecological Score (Known + Potential)	2	
Adjusted Total Ecological Score	2	(maximum 18)
5. Other Receptors	0	1
Total Other Receptors Score (Known + Potential)	1	
Total Exposure Score (Human + Ecological + Other)	3	
Adjusted Total Score (Total Exposure/46*34)	**2.2**	(maximum 34)

Site Score

Site Letter Grade	**B**
Certainty Percentage	**88%**
% Responses that are "Do Not Know"	**2%**
Total NCSCS Score for site	**61.7**
Site Classification Category	**2**

Site Classification Categories*:

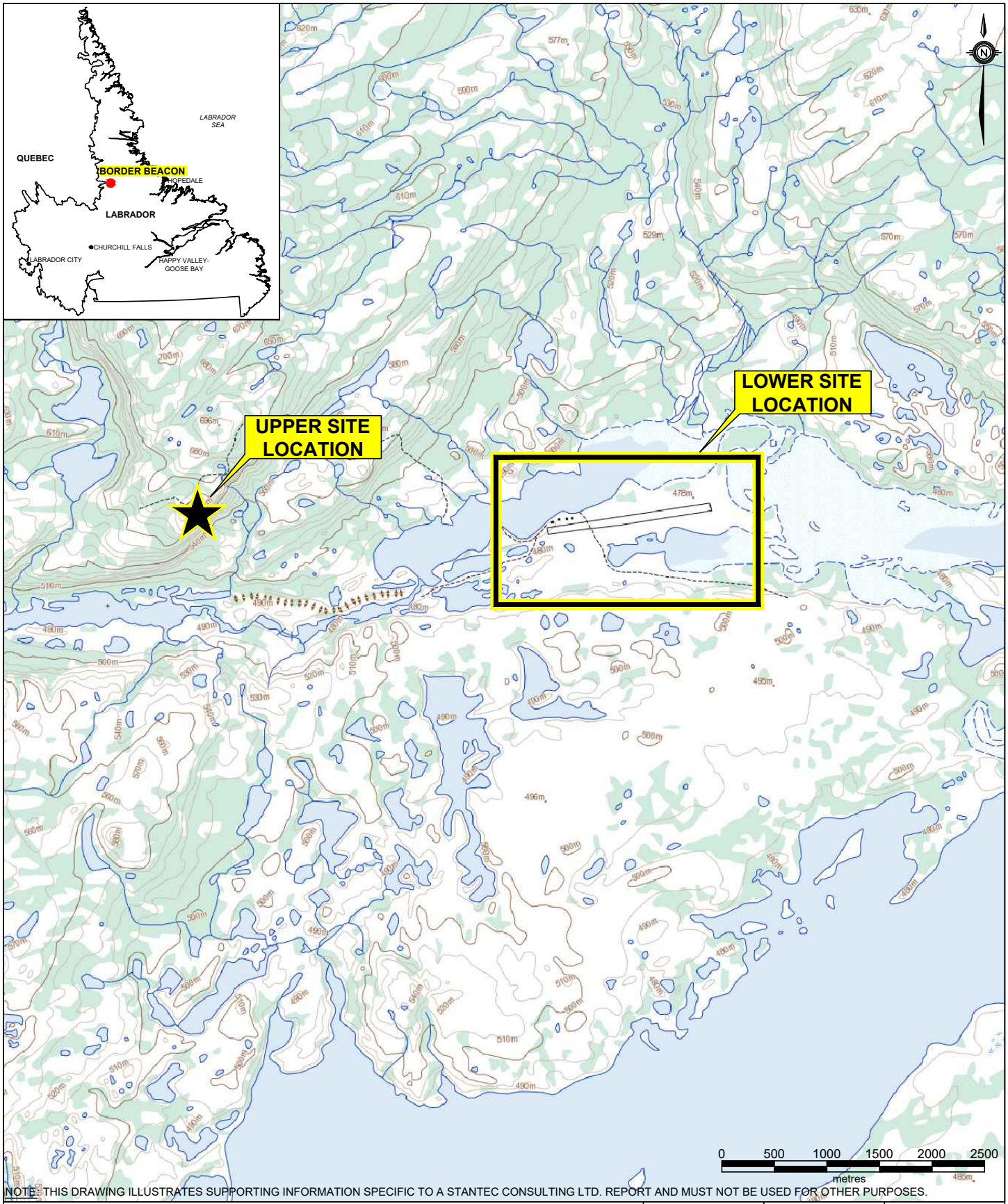
Class 1 - High Priority for Action (Total NCS Score >70)
Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
Class N - Not a Priority for Action (Total NCS Score <37)
Class INS - Insufficient Information (≥15% of responses are "Do Not Know", or a site letter grade of F has been assigned)

* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT: NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT	SCALE: 1:5,000,000	DATE: SEPT. 6, 2018	REV. No. 0
	DRAWN BY: N.M.	EDITED BY: -	CHECKED BY: J.S.
PROJECT TITLE: PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL	DRAWING No: 121414998-EE-01	CAD FILE: 121414998-EE-01.DWG	
DRAWING TITLE: SITE LOCATION PLAN	Stantec		

06SEP18 9:00AM



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CLIENT:
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PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SITE LOCATION PLAN - BORDER BEACON

SCALE:	DATE:	REV. No.
1:50,000	SEPT. 6, 2018	0
DRAWN BY:	EDITED BY:	CHECKED BY:
N.M.	-	J.S.
DRAWING No:	CAD FILE:	
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LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- SEDIMENT SAMPLE (STANTEC 2017)
- SURFACE WATER SAMPLE (STANTEC 2017)
- VEGETATION / BERRY SAMPLE (STANTEC 2017)
- METALS EXCEEDANCE IN SURFACE WATER
- 1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)
- ASSUMED DIRECTION OF GROUNDWATER FLOW

ASHUAPUN LAKE

BB-SED2 BB-SW2

BB-SED1 BB-SW1

BB-SS8

BB-VEG1

BB-SS10

1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

CAMP / ANTENNA AREAS AND AES COMPOUND
SEE DRAWING No. 121414998-EE-04/EE-05

BB-SS3

2018-VEG08

2018-MW47

BB-SS7

GRAVEL AIR STRIP

BB-TP49

2018-MW48

BB-SS9

443.00

444.5

BB-SS4

BB-SS1

BB-SS2

BB-SS5

BB-SS6

BB-TP1

APPROXIMATE LOCATION OF ABANDONED 3,540L TANK

2018-SED06 2018-SW06

UNKNOWN FOUNDATION / BUILDING
SEE DRAWING No. 121414998-EE-06

WASTE DISPOSAL SITES
SEE DRAWING No. 121414998-EE-07/EE-08

FORMER INNU CAMP
SEE DRAWING No. 121414998-EE-09

446.00 447.00 448.00 447.5 447.00 446.5 446.00 445.5 446.5 445.5

GENERAL DUMP SITE
SEE DRAWING No. 121414998-EE-010

444.5

ASHUAPUN LAKE

0 50 100 150 200 250
metres

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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - LOWER SITE - GENERAL AREA

SCALE:	DATE:	REV. No.
1:6000	JAN. 16, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No.: 121414998-EE-03	CAD FILE: 121414998-EE-03.DWG	

Stantec

16JAN19 8:00AM

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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER) PLAN - CAMP / ANTENNA AREAS AND AES COMPOUND

SCALE:	DATE:	REV. No.
1:800	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-04	CAD FILE: 121414998-EE-04.DWG	

Stantec

12APR19 2:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- PHC EXCEEDANCE IN GROUNDWATER
- PAH EXCEEDANCE IN GROUNDWATER
- METALS EXCEEDANCE IN GROUNDWATER
- PCB EXCEEDANCE IN GROUNDWATER
- 1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

2018-SED08 2018-SW08
ASHUAPUN LAKE
2018-SED09 2018-SW09
2018-SW07 2018-SED07
2018-VEG02
2018-VEG01
2018-MW53 2018-MW51 2018-MW52 2018-MW17 2018-MW50 2018-MW18 2018-MW26 2018-MW27 2018-MW32 2018-MW21 2018-MW20 2018-MW31 2018-MW09 2018-MW11 2018-MW05 2018-MW06 2018-MW08 2018-MW01
2018-BH19 2018-BH16 2018-BH14 2018-BH15 2018-BH25 2018-BH24 2018-BH23 2018-BH28 2018-BH22 2018-BH30 2018-BH29 2018-BH13 2018-BH12 2018-BH10 2018-BH04 2018-BH07 2018-BH03
2018-SS12 2018-SS13 2018-SS18 2018-SS14 2018-SS16 2018-SS17 2018-SS15 2018-SS10 2018-SS11 2018-SS09 2018-SS06 2018-SS07 2018-SS08 2018-SS03 2018-SS04 2018-SS05 2018-SS02 2018-SS01
BB-TP18 BB-TP20 BB-TP21 BB-TP19 BB-TP17 BB-TP22 BB-TP23 BB-TP24 BB-TP25 BB-TP26 BB-TP27 BB-TP28 BB-TP30 BB-TP31 BB-TP32 BB-TP33 BB-TP34 BB-TP35
BB-SS24 BB-SS25 BB-SS26 BB-SS27 BB-SS28 BB-SS29 BB-SS30 BB-SS31 BB-SS32 BB-SS33 BB-SS34 BB-SS35 BB-SS36 BB-SS37 BB-SS38 BB-SS40
2018-SS49

SHED
CELLULAR
DYKED 113,516L TANK
DRUMS
TEN 4,500L ASTs
FORMER 900L AST
ANTENNA (OIL FILLED)
FORMER CAMP BUILDING #3
FORMER 4,546L AST
FORMER ABOVE GROUND SEPTIC TANK
FORMER ANTENNA
FORMER ANTENNA
FORMER ANTENNA
FORMER CAMP BUILDING #4 (APPROXIMATE LOCATION)
AES BUILDING #1 STORAGE
AES BUILDING #2 EQUIPMENT
CAMP GARAGE BUILDING #2
TWO 4,500L ASTs
TANK CRADLE
CAMP FUEL SHED BUILDING #1
FORMER RE-FUELING AREA
FORMER DRUM STORAGE AREA
FORMER LOCATION OF LEAKING DRUMS
1998 ENVIRONMENT CANADA LAND TRANSFER (APPROXIMATE)

0 10 20 30 40 50
metres

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PROJECT TITLE: PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE: SAMPLING AND EXCEEDANCE (GROUNDWATER) PLAN - CAMP / ANTENNA AREAS AND AES COMPOUND

SCALE:	DATE:	REV. No.
1:800	APR.12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-05	CAD FILE: 121414998-EE-05.DWG	

Stantec

12APR19 2:00PM

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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

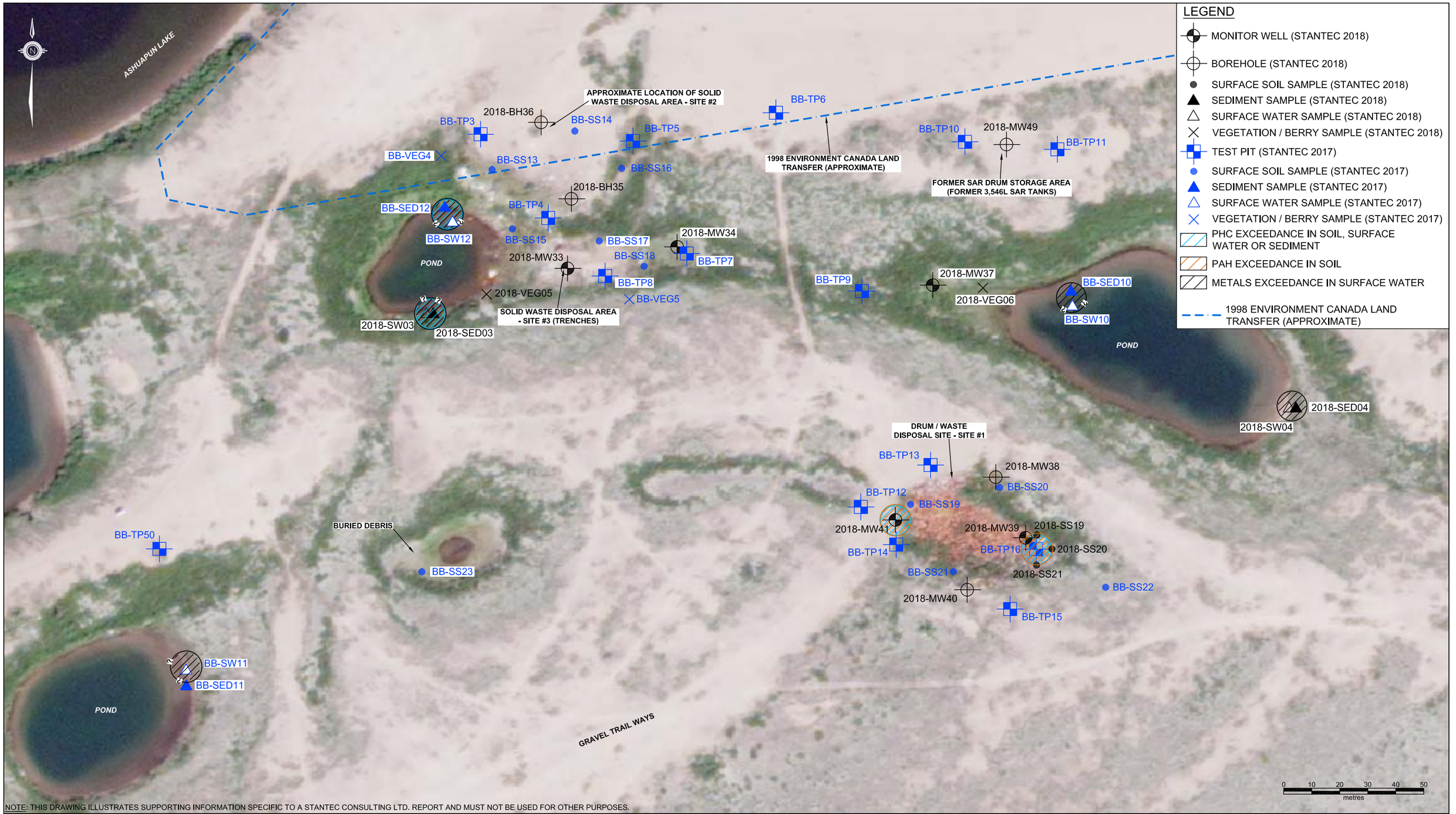
PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - UNKNOWN FOUNDATION / FORMER BUILDING

SCALE:	DATE:	REV. No.
1:1250	OCT. 09, 2018	0
DRAWN BY: N.M.	EDITED BY: S.A.	CHECKED BY:
DRAWING No: 121414998-EE-06	CAD FILE: 121414998-EE-06.DWG	

Stantec

04SEP18 10:00AM



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

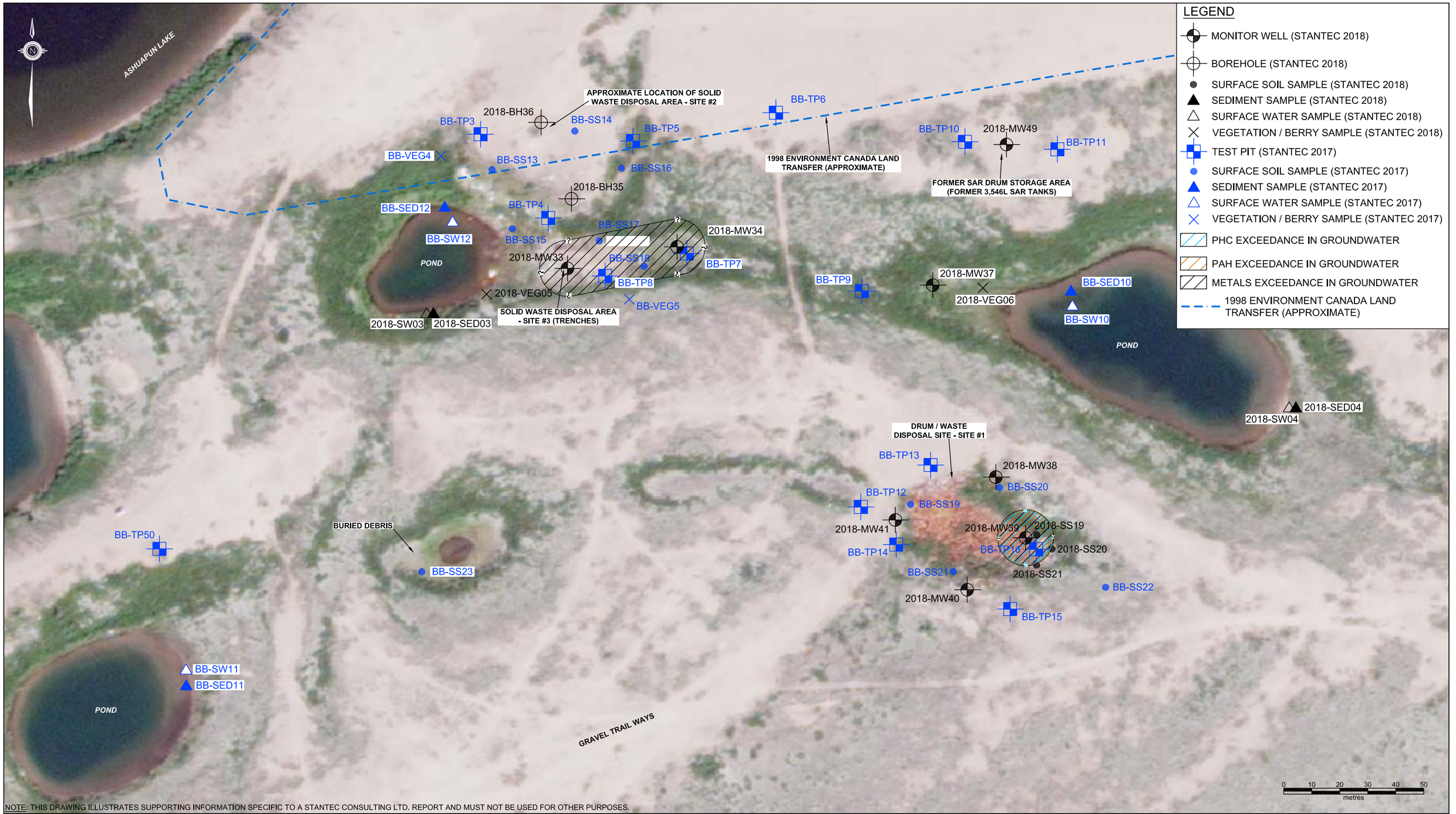
PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER, AND SEDIMENT) PLAN - WASTE DISPOSAL SITES

SCALE:	DATE:	REV. No.
1:1250	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-07	CAD FILE: 121414998-07.DWG	

Stantec

12APR19 2:00PM



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (GROUNDWATER) PLAN - WASTE DISPOSAL SITES

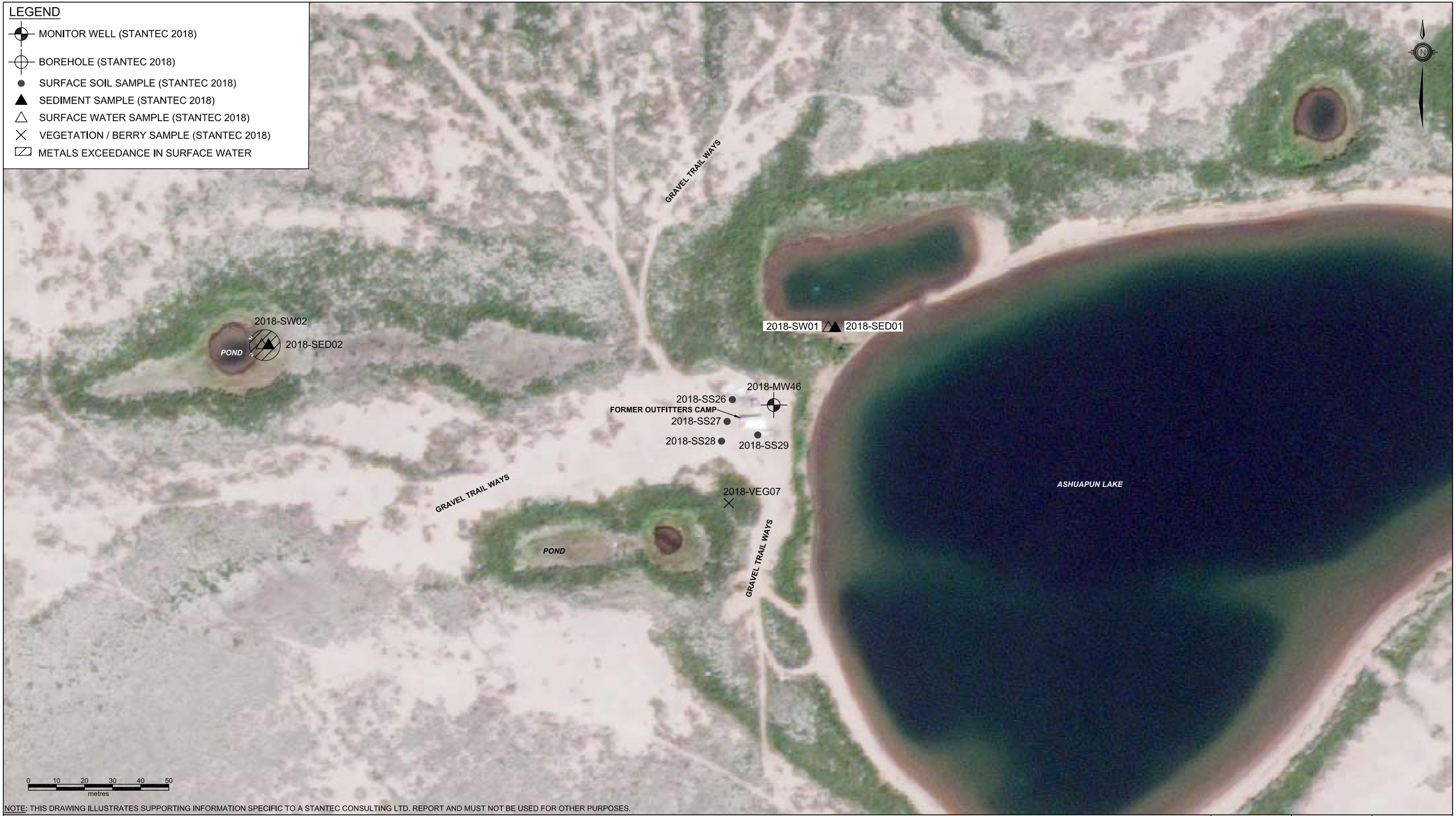
SCALE:	DATE:	REV. No.
1:1250	APR. 12 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-08	CAD FILE: 121414998-08.DWG	

Stantec

12APR19 2:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- METALS EXCEEDANCE IN SURFACE WATER



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - FORMER INNU CAMP

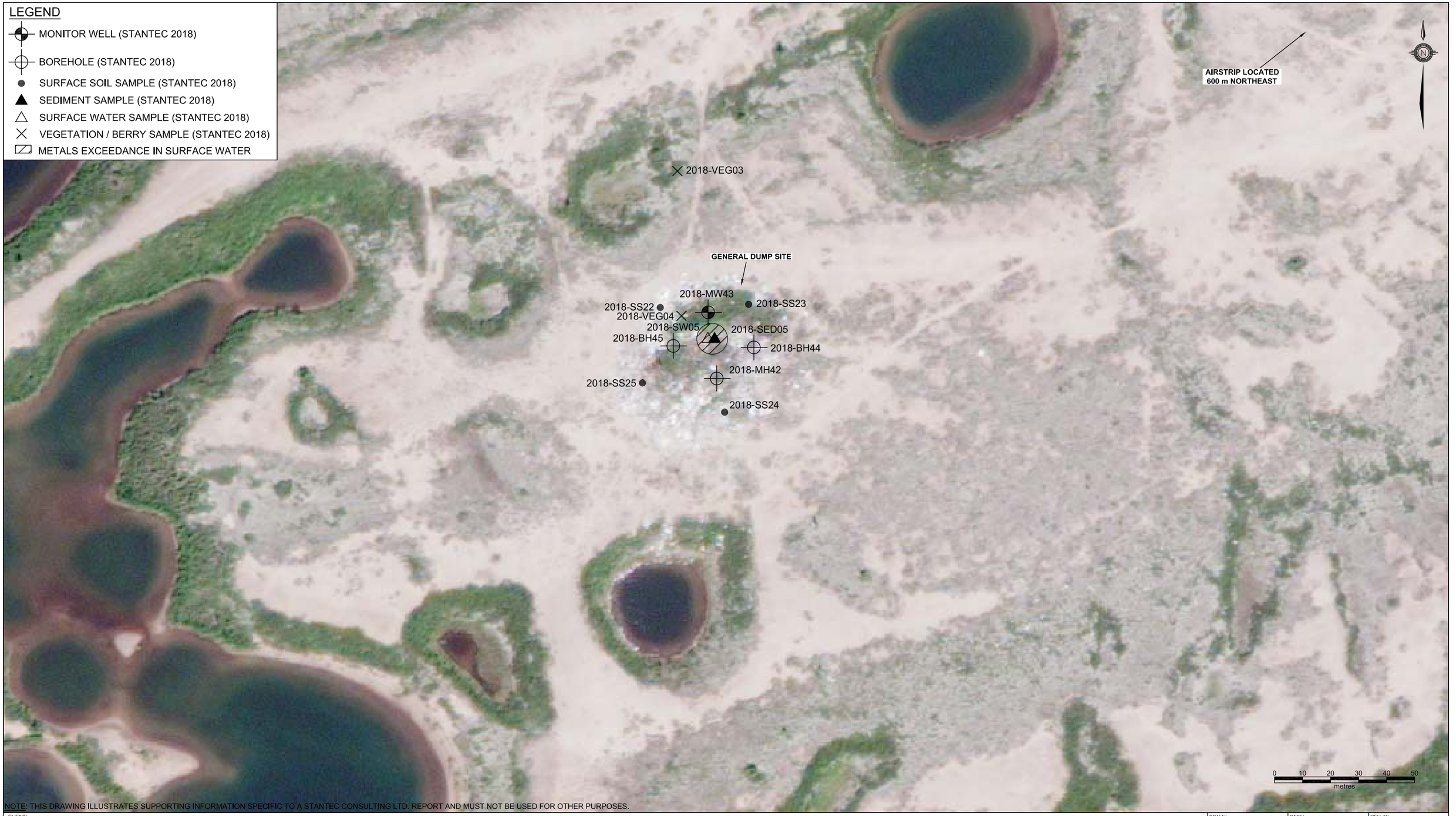
SCALE:	DATE:	REV. No.
1:1250	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-09	CAD FILE: 121414998-EE-09.DWG	

Stantec

12APR19 02:00PM

LEGEND

- MONITOR WELL (STANTEC 2018)
- BOREHOLE (STANTEC 2018)
- SURFACE SOIL SAMPLE (STANTEC 2018)
- SEDIMENT SAMPLE (STANTEC 2018)
- SURFACE WATER SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- METALS EXCEEDANCE IN SURFACE WATER



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CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SURFACE WATER) PLAN - GENERAL DUMP SITE

SCALE:	DATE:	REV. No.
1:1250	OCT. 09, 2018	0
DRAWN BY:	EDITED BY:	CHECKED BY:
C.F.	S.A.	J.S.
DRAWING No:	CAD FILE:	
121414998-EE-10	121414998-EE-10.DWG	

Stantec

12SEP18 10:00AM

Upper Site

CCME National Classification System for Contaminated Sites (2008) version 1.3
Summary of Site Conditions

Site:	Site will be identified by:	Site Common Name
Civic Address: *(or other description of location)*	Former US Military Mid Canada Line Radar Site 212, Border Beacon, Newfoundland and Labrador (NL)	
Site Common Name: *(if applicable)*	Border Beacon (Upper Site)	
Code identifier: *(e.g., FCSI 8-digit identifier)*	Not applicable	
Site Owner or Custodian: *(Organization and Contact Person)*	Government of Newfoundland and Labrador	
Legal description *or* metes and bounds:	See Drawing No. 121414998-EE-11 attached	
Approximate Site area:	Approximately 4 Hectares (Upper Site)	
Parcel Identifier(s) [PID]: *(or Parcel Identification Numbers [PIN] if untitled Crown land)*		
Centre of site: *(provide latitude/longitude or UTM coordinates)*	Latitude:_55_____ degrees __19____ min __57____ secs; Longitude:__63____ degrees __12____ min __27____ secs	
	UTM Coordinate: Northing _____ Easting _____	
Site Land Use:	Current:	Commercial
	Proposed:	Commercial
Site Plan	**To delineate the bounds of the Site a site plan MUST be attached. The plan must be drawn to scale indicating the boundaries in relation to well-defined reference points and/or legal descriptions. Delineation of the contamination should also be indicated on the site plan.**	
Provide a brief description of the Site:	The Border Beacon site is located to the east of the Labrador-Quebec border and is approximately 190 km west of Hopedale, 200 km northeast of Churchill Falls and 285 km northwest of Happy Valley-Goose Bay (refer to Drawing Nos. 121414998-EE-01 and EE-02, attached). The Border Beacon site covers a land area of approximately 200 hectares. The Border Beacon facility was operated by the U.S. Military as a radar site from 1958 to 1965. As little is documented about the site, it is assumed that the upper site was similar to other Mid Canada Line (MCL) stations of the same era and consisted of an operations building, 4 communication antennae towers linked by a cable trough and wood trestle, an emergency shelter, 9 aboveground storage tanks (ASTs) and a helicopter pad. A 1987 document noted that the buildings and towers were to be demolished and buried as part of a decommissioning program. The lower site consisted of an airstrip, a fuel storage facility, accommodations and a fuel pump house. Transport Canada occupied the site in 1965 until the 1970s as a weather station. In 1986, four buildings on the lower site to the northwest of the airstrip were sold to Mr. C.W. House of Goose Bay. From 1994 to 1999, DND operated a fuel cache along the south portion of the airstrip. In 1996, an inspection by the NL Government noted the airstrip, four site buildings, fuel cache, large drum disposal dump (Waste Disposal Site #1), landfill (Waste Disposal Site #2) and refuse/debris in open trenches to the east of the landfill (Waste Disposal Site #3). In 1998, the Province transferred five parcels of land to Environment Canada including the airstrip and a parcel of land approximately 90 m by 180 m located to the north of the airstrip. See Drawing Nos. 121414998-EE-01, 121414998-EE-02 and 1214149998-EE-11 attached. The Upper Site is the subject of this NCSCS.	

CCME National Classification System for Contaminated Sites (2008) version 1.3
Summary of Site Conditions

Affected media and Contaminants of Potential Concern (COPC):	Soil: petroleum hydrocarbons, metals Surface water: petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) Sediment: metals

Please fill in the "letter" that best describes the level of information available for the site being assessed:

Site Letter Grade **B**

If letter grade is F, do not continue, you must have a minimum of a Phase I Environmental Site Assessment or equivalent.

Scoring Completed By:	Paula Brennan/Kelly Johnson
Date Scoring Completed:	22-Feb-19

CCME National Classification System for Contaminated Sites (2008) version 1.3
Pre-Screening Checklist

Question	Response (yes / no)	Comment
1. Are **Radioactive material**, **Bacterial contamination** or **Biological hazards** likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2. Are there **no contamination exceedances** (known or suspected)? Determination of exceedances may be based on: 1) CCME environmental quality guidelines; 2) equivalent provincial guidelines/standards if no CCME guideline exists for a specific chemical in a relevant medium; or 3) toxicity benchmarks derived from the literature for chemicals not covered by CCME or provincial guidelines/standards; or 4) background concentration.	No	If yes (*i.e.*, there are no exceedances), do not proceed through the NCSCS.
3. Have **partial/incompleted or no environmental site investigations** been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4. Is there direct and significant evidence of **impacts to humans** at the site, or off-site due to migration of contaminants from the site?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated.
5. Is there direct and significant evidence of **impacts to ecological receptors** at the site, or off-site due to migration of contaminants from the site?	No	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are considered to be severe, the site may be categorized as Class 1, regardless of the numerical total NCSCS score. For the purpose of application of the NCSCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction.
6. Are there indicators of significant **adverse effects in the exposure zone** (*i.e.*, the zone in which receptors may come into contact with contaminants)? Some examples are as follows: -Hydrocarbon sheen or NAPL in the exposure zone -Severely stressed biota or devoid of biota; -Presence of material at ground surface or sediment with suspected high concentration of contaminants such as ore tailings, sandblasting grit, slag, and coal tar.	No	To answer "yes", two scenarios should be satisfied; (1) there has to be a high probability that receptors will be exposed to the contaminant source in the near future, and (2) the predicted impacts to ecological receptors after exposure must be significant (see question 5). A low probability of exposure resulting in significant impacts, or a high probability of exposure but with only low to moderate effects expected should not result in a Class 1 designation, neither would a low probability of exposure resulting in low-to-moderate effects. If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated.
7. Do measured concentrations of volatiles or unexploded ordnances represent an **explosion hazard**?	No	If yes, do not proceed through the NCSCS. Do not continue until the safety risks have been addressed. Consult your jurisdiction's occupational health and safety guidance or legislation on exposive hazards and measurement of lower explosive limits.

CCME National Classification System for Contaminated Sites (2008) version 1.3
Pre-Screening Checklist

Rationale for not proceeding with NCSCS
(document any assumptions, reports, or site-specific information to support selection of "Yes" in Pre-Screening checklist)

If none of the above applies, proceed with the NCSCS scoring.

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = does not have an exceedance or strongly suspected not to have an exceedance		Based on the results of sampling in 2017 and 2018, petroleum hydrocarbons, polycyclic aromatic hydrocarbon (PAH) and/or metal parameters have exceeded applicable provincial and/or CCME guidelines in soil, sediment, and/or surface water (Stantec, 2018; 2019).	The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline). Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at http://st-ts.ccme.ca/ For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes			
Yes No Do Not Know				
B. Groundwater	Yes			
Yes No Do Not Know				
C. Surface water	Yes			
Yes No Do Not Know				
D. Sediment	Yes			
Yes No Do Not Know				
"Known" -score	8			
"Potential" - score	---			
2. Chemical Hazard				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	High	The relative degree of chemical hazard for cadmium, lead and nickel is high (Stantec, 2018; 2019).	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site. The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) has been provided as a separate sheet in this file. *See Attached Reference Material for Contaminant Hazard Rankings.*	Hazard as defined in the revised NCSCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
High Medium Low Do Not Know				
"Known" -score	8			
"Potential" - score	---			

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
3. Contaminant Exceedance Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")? NAPL (mobile or immobile) High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know	High (>100x)	The ratio of a measured copper concentration in soil (i.e., 48,000 mg/kg) is greater than 100x the applicable guideline of 91 mg/kg (CCME CSQG) (Stantec, 2018; 2019).	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the *most conservative media-specific and land-use appropriate CCME* environmental quality guidelines. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines NAPL (LNAPL or DNAPL) = Contaminant is a non-aqueous phase liquid (*i.e.,* due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (*i.e.*, greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Any amount of NAPL should be scored, *i.e*. small amounts and sheens cannot be ignored. The presence of a NAPL (mobile or immoblie or regardless of amount) may be considered unnaceptable by some jurisidcations. If NAPL is present, consult jurisdiction on how to proceed with NCSCS. Other standards may include local background concentration or published toxicity benchmarks. Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria. Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (*i.e.*, CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8) because of its highly concentrated nature and potential for increase in the size of the impacted zone.
"Known" -score	6			
"Potential" - score	---			
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	<2 ha or 1000 m3	Contaminated soil and sediment exceeding Tier I RBSLs, Tier I ESLs and/or CCME SQGs/WQGs on Site has not been delineated, but is estimated to be at least approximately 82 cubic metres (Stantec 2018; 2019).	Measure or estimate the area or quantity of total contamination (*i.e*, all contaminants known or strongly suspected to be present on the site). The "Area of Contamination" is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
"Known" -score	2			
"Potential" - score	---			

CCME National Classification System (2008) version 1.3

(I) Contaminant Characteristics

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	No	No persistent chemicals were detected on the Upper SIte above applicable guidelines (Stantec, 2018; 2019).	Persistent chemicals, *e.g.,* PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air, (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days. Elements do not degrade, therefore treat any metal, metalloid, or halogen COPC as persistent.	*Examples of Persistent Substances are provided in attached Reference Materials*
Are there contaminants present that could cause damage to utilities and infrastructure, either now or in the future, given their location? Yes No Do Not Know	Yes	Contaminants such as petroleum hydrocarbons may be suspected to cause damage to utilities or infrastructure if the area is developed in the future (Stantec, 2018; 2019).	If answered Yes, in Rationale for Score column document the location and extent of the infrastructure that is/may be damaged, verify the mode of contact between contaminants of potential concern (COPCs) and infrastructure, list the specific COPCs that could cause damage, and note the expected effect on specific infrastructure.	Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.
How many different contaminant classes have representative CCME guideline exceedances? one two to four five or more Do Not Know	five or more	Identified contaminants in sediment, soil and/or surface water are volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, inorganic substances (metals) and PAHs (Stantec, 2018; 2019).	For the purposes of the revised NCSCS, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	*Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.*

"Known" - Score	5
"Potential" - Score	---

Contaminant Characteristic Total

Raw Total Score- "Known"	29
Raw Total Score- "Potential"	---
Raw Combined Total Score (Known + Potential)	29
Adjusted Total Score (Raw Combined / 40 * 33)	**23.9**

maximum 33

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(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.				
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	12	Go to potential.	Review chemical data and evaluate groundwater quality. The evaluation method concentrates on 1) a potable or non-potable groundwater environment; 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking water quality. The aquifer can currently be used as a potable water supply or could have the potential for use in the future. Non-potable groundwater environments are defined as areas that are serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis. Physical evidence includes significant sheens, liquid phase contamination, or contaminant saturated soils. Seeps and springs are considered part of the groundwater pathway. In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries. Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links. Note that for potable groundwater that also daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality: http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php Non-Potable Environments CCME. 1999. Canadian Water Quality Guidelines for Protection of Aquatic Life. http://ceqg-rcqe.ccme.ca/ Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	9			
iii) Meets GCDWQ for potable environments; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for non-potable environments or Absence of groundwater exposure pathway (*i.e.,* there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Known COPC Exceedances, then you should skip Part B (Potential for groundwater pathway) and go to Section 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative mobility of contaminant High Moderate Low Insignificant Do Not Know		The relative mobilities of the contaminants (petroleum hydrocarbons, inorganic substances (metals) and PAHs) are low (Stantec, 2018; 2019).	Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (*i.e.,* log Koc < 2.7) — pH < 5 — pH > 8.5 Koc = 500 to 5000 (*i.e.,* log Koc = 2.7 to 3.7) — pH = 5 to 6 — pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (*i.e.,* log Koc = 3.7 to 5) — pH > 6 — pH < 7.5 Koc > 100,000 (*i.e.,* log Koc > 5) For PHC fractions; score F1 as Moderate, F2 as Low, and F3 and F4 as Insignificant.	Reference: US EPA Soil Screening Guidance (Part 5 - Table 39) If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
	Low			
Score	1			
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know		No engineered sub-surface containment is present (Stantec, 2018; 2019).	Review the existing engineered systems or natural attenuation processes for the site and determine if full or partial containment is achieved. Full containment is defined as an engineered system or natural attenuation processes, monitored as being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for “Full Containment” scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128.
	No containment			
Score	3			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
c. Thickness of confining layer over aquifer of concern or groundwater exposure pathway 3 m or less including no confining layer or discontinuous confining layer 3 to 10 m > 10 m Do Not Know	3 m or less	The confining layer over the groundwater exposure pathway is considered to be 3 m or less (Stantec, 2018; 2019).	The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (*e.g.,* water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
Score	1			
d. Hydraulic conductivity of confining layer >10^{-4} cm/s or no confining layer 10^{-4} to 10^{-6} cm/s <10^{-6} cm/s Do Not Know	10-4 to 10-6 cm/s	The hydraulic conductivity of the confining layer is considered to be 10-5 to 10-8 cm/s (sand) (Stantec, 2018; 2019).	Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity ("K") of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability ("k") of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	
Score	0.5			
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High (infiltration score > 0.6) Moderate (0.4 < infiltration score ≤ 0.6) Low (0.2 < infiltration score ≤ 0.4) Very Low (0 < infiltration score ≤ 0.2) None (infiltration score = 0) Do Not Know	Moderate	The precipitation infiltration rate is estimated to be moderate. As there is no precipitation data for Border Beacon, the weather station at Goose Bay Airport is used as a reference. Goose Bay's annual precipitation is approximately 940.4 mm (Environment Canada, 2017). Surface soil relative permeability is 0.6 for sand. The precipitation infiltration rate is 940.4 / 1000 x 0.6 = 0.56 (Stantec, 2018; 2019).	<u>Precipitation</u> Refer to Environment Canada precipitation records for relevant areas (30 year average preferred). Divide annual precipitation (rainfall + snowfall) by 1000 and round to nearest tenth (*e.g.,* 667 mm = 0.7 score). <u>Permeability</u> For surface soil relative permeability (*i.e.*, infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0). Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate (*e.g.,* precipitation factor of 0.7 from above x 0.6 (sand) = 0.42 or "Moderate").	Selected Sources: Environment Canada web page link: <u>http://climate.weather.gc.ca/climate_normals/index_e.html</u> Snow to rainfall conversion apply ratio of 10(snow):1(water) <u>https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=108C6C74-1</u>
Score	0.6			
f. Hydraulic conductivity of aquifer >10^{-2} cm/s 10^{-2} to 10^{-4} cm/s <10^{-4} cm/s Do Not Know	10-2 to 10-4 cm/s	Bedrock in the area of the site is undifferentiated metamorphic gneiss in the Southeastern Churchill Province of the Archean and/or Paleoproterozoic age. The hydraulic conductivity of the bedrock layers (assuming to be fractured) is estimated to range from 1.0 x 10-6 cm/sec to 10 x 10-2 cm/sec (Stantec, 2018; 2019).	Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
Score	1			
Potential groundwater pathway total	7.1	Note: If a "known" score is provided, the "potential" score is disallowed.		
Allowed Potential score	---			
Groundwater pathway total	**12**			

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCME CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (*e.g.,* toxicity testing; or other indicator testing of exposure). ii) Same as (i) except the information is not known but strongly suspected based on indirect observations. iii) Meets CWQG or absence of surface water exposure pathway (*e.g.,* Distance to nearest surface water is > 5 km.) Score	12 8 0 12 12	Concentrations of metals exceed the CCME CWQGs (Stantec, 2018; 2019).	Collect all available information on quality of surface water near to site. Evaluate available data against Canadian Water Quality Guidelines (select appropriate guidelines based on local water use, *e.g.,* recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigation, livestock watering, aquatic life. Examples of indirect evidence may include observed staining of sediment and/or river banks, but surface water has not been tested.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References: CCME. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life http://ceqg-rcqe.ccme.ca/ CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) http://ceqg-rcqe.ccme.ca/ Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality. http://www.hc-sc.gc.ca/ewh-semt/water-eau/recreat/index-eng.php
NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you should skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)				
B. Potential for migration of COPCs in surface water				
a. Presence of containment No containment Partial containment Full containment Do Not Know Score	 Do Not Know 3	Skip B if A is complete.	Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers between the site and nearby surface water. Full containment must include containment of all chemicals.	
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know Score	 Do Not Know 2	Skip B if A is complete.	Review available mapping and survey data to determine distance to nearest surface water bodies.	
c. Topography Contaminants above ground level and slope is steep Contaminants at or below ground level and slope is steep Contaminants above ground level and slope is intermediate Contaminants at or below ground level and slope is intermediate Contaminants above ground level and slope is flat Contaminants at or below ground level and slope is flat Do Not Know Score	 Do Not Know 1	Skip B if A is complete.	Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (*e.g.,* trench, above ground, etc.).	
d. Run-off potential High (run-off score > 0.6) Moderate (0.4 < run-off score ≤ 0.6) Low (0.2 < run-off score ≤ 0.4) Very Low (0 < run-off score ≤ 0.2) None (run-off score = 0) Do Not Know Score	 Do Not Know 0.4	Skip B if A is complete.	Precipitation Refer to Environment Canada precipitation records for relevant areas (30 year average preferred). Divide precipitation (rainfall + snowfall) by 1000 and round to nearest tenth (*e.g.*, 667 mm = 0.7 score). Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the permeability (infiltration) factor with precipitation factor to obtain Run-off potential score (*e.g.*, precipitation factor of 0.7 from above x 0.6 (loam) = 0.42 or "Moderate").	Selected Sources: Environment Canada web page link: http://climate.weather.gc.ca/climate_normals/index_e.html Snow to rainfall conversion apply ratio of 10(snow):1(water) https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=108C6C74-1

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
e. Flood potential 1 in 2 years 1 in 10 years 1 in 50 years not in floodplain Do Not Know	Do Not Know	Skip B if A is complete.	Review published data such as flood plain mapping or flood potential (*e.g.,* spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Score	0.5			
Potential surface water pathway total	6.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**12**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline.	12	Identified contaminants in surface soils exceeeding CCME soil quality guidelines are petroleum hydrocarbons and inorganic substances (metals) (Stantec, 2018; 2019).	Collect all available information on quality of surface soils (*i.e.,* top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (*i.e,* agricultural, residential/parkland, commercial, or industrial), and soil texture if applicable (*i.e.,* coarse or fine). Examples of strongly suspected exceedences of soil guidelines may include evidence of staining, odours, or significant debris infill materials.	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. http://ceqg-rcqe.ccme.ca/
Strongly suspected that soils exceed guidelines.	9			
COPCs in surface soils does not exceed the CCME soil quality guideline or is not present (i.e., bedrock).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you should skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
a. Are the soils in question covered? Exposed Vegetated Landscaped Paved Do Not Know	Do Not Know	Skip B if A is complete.	Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NCSCS as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
Score	4			
b. For what proportion of the year does the site remain covered by snow? 0 to 10% of the year 10 to 30% of the year More than 30% of the year Do Not Know	Do Not Know	Skip B if A is complete.	Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).	
Score	3			
Potential surface soil pathway total	7			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Soil pathway total	**12**			
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations.	12	Go to potential.	Consult previous investigations, including human health risk assessments, for reports of vapours detected. Due to the potential for significant spatial and temporal variation in soil vapour concentrations, limited vapour monitoring studies (*e.g.,* single point in time "snap-shot") that do not detect vapour at sites where volatiles are suspected, does not necessarily mean that vapours are not an issue at the site. In this case, section B " Potential for COPCs in vapour" should be completed.	
Strongly suspected (based on observations and/or modelling)	9			
Vapour has not been measured (i.e. not detected) and volatile hydrocarbons have not been found in site soils or groundwater, or vapour has been measured (indoor or outdoor) in concentrations not exceeding risk based concentrations.	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you should skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)				

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H' (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3) Low (H' < 1.0E-3) Not Volatile Do Not Know	Moderate	According to the attached Reference Materials, petroleum hydrocarbons (F2) are considered to have moderate volatility (Stantec, 2018; 2019).	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36) *Provided in Attached Reference Materials* For PHC fractions; score F1 as High, F2 as Moderate, and F3 and F4 as Not Volatile. Substance is considered Not Volatile (*i.e.*, pathway not a concern) if the product of the water solubility and unitless Henry's law constant does not exceed published or derived tolerable concentration or risk-specific concentration. If NAPL is present, see Appendix D of the CCME soil vapour quality guideline protocol (CCME 2014) for further guidance.	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5. Selected References: CCME. 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours. Winnipeg, Manitoba. http://ceqg-rcqe.ccme.ca
Score	2.5			
b. What is the soil grain size? Fine Coarse Do Not Know	Coarse	The soil grain size is considered to be coarse (Stantec, 2018; 2019).	Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know	Yes	The depth to source is less than 10 m (Stantec, 2018; 2019).	Review groundwater depths below grade for the site.	
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know	Yes	The bedrock on the site is considered to be fractured (Stantec, 2018; 2019).	Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathyways.	Preferential pathways refer to areas where vapour migration is more likely to occur because there is lower resistance to flow than in the surrounding materials. For example, underground conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
Score	2			
Potential vapour pathway total	10.5			
Allowed Potential score	10.5	Note: If a "known" score is provided, the "potential" score is disallowed.		
Vapour pathway total	**10.5**			
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12	Go to potential.	Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in this area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future. or Sediment meets CCME sediment quality guidelines or absence of sediment exposure pathway (*i.e.,* within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you should skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)				

CCME National Classification System (2008) version 1.3

(II) Migration Potential (Evaluation of contaminant migration pathways)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")?	No	Sediments are not capped. Sediments in shallow water are not considered to be likely affected by tidal action, wave action or propeller wash. The sediments are not considered to be in an area prone to sediment scouring (Stantec, 2018; 2019).	Review existing sediment assessments. If sediment coring has been completed, it may indicate that historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
Yes				
No				
Do Not Know	4			
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash?	No		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
Yes				
No				
Do Not Know	0			
c. For rivers, are the contaminated sediments in an area prone to sediment scouring?	No		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional may become scoured. If the sediments present at the site are in a lake or marine habitat, select "no" for this question.	
Yes				
No				
Do Not Know	0			
Potential sediment pathway total	4			
Allowed Potential score	4	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**4**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected by contamination?	Yes	There are buried debris and materials on the Upper Site that could act as conduits for contaminant migration (Stantec, 2018; 2019).	Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Yes				
No				
Do Not Know				
Known	4			
Potential	---			

Migration Potential Total

Raw Total Score- "Known"	40	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore,
Raw Total Score- "Potential"	14.5	the total "Potential" Score may not reflect the sum of the individual "Potential" scores.
Raw Combined Total Score (Known + Potential)	54.5	
Adjusted Total Score (Raw Combined / 64 * 33)	**28.1**	maximum 33

CCME National Classification System (2008) version 1.3

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Human				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site. (Class 1 Site*)	22	Based on the human health risk assessment, adverse effects to humans exposed to COPC at the site are considered unikely (Stantec, 2019).	*Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (*i.e.,* action required). Known impacts could include blood test results (*e.g.,* blood lead > 10 µg/dL) or results of other health based studies and tests. There is no need to proceed through the NCSCS in this case. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired. A score of 22 can also be assigned when Hazard Quotients (or Hazard Index) >> 1.0 or incremental lifetime cancer risks considerably exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals. The category, "Strongly suspected", can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients (or Hazard Index) > 0.2 (excluding the Estimated Daily Intake) or > 1.0 with Estimated Daily Intake and/or incremental lifetime cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{-5}$ or $>10^{-6}$). The category, no exposure/impacts, can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients (or Hazard Index) of ≤ 0.2 (excluding the Estimated Daily Intake) or ≤ 1.0 with Estimated Daily Intake AND incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{-6} or 10^{-5}).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments, available at http://www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index-eng.php United States Environmental Protection Agency, Integrated Risk Information System (IRIS), available at http://toxnet.nlm.nih.gov
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	10			
No quantified or suspected exposures/impacts in humans.	0			
	0			
Score	0			
NOTE: If a score is assigned here for Known Exposure, then you should skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know	Do Not Know	Skip B if A is complete.	Review zoning and land use maps over the distances indicated. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place. Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (*e.g.,* greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Parkland includes campgrounds, but excludes wildlands such as national or provincial parks. Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of more sensitive human receptors (*e.g.,* children).
Score	1.5			
b) Indicate the level of accessibility to the contaminated portion of the site (*e.g.,* the potential for coming in contact with contamination) Limited barriers to prevent site access; contamination not covered Moderate access or no intervening barriers, contaminants are covered. Remote locations in which contaminants not covered. Controlled access or remote location and contaminants are covered Do Not Know	Do Not Know	Skip B if A is complete.	Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	
Score	1			
B. Potential for human exposure				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential). i) direct contact Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated? Yes No Do Not Know	Do Not Know	Skip B if A is complete.	If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
Score	1.5			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
ii) inhalation (*i.e.,* inhalation of dust, vapour)		Skip B if A is complete.		Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion.
Vapour - Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet II (Migration Potential)?			If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a), *Potential for COPCs in Vapour* for a definition of volatility.	Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts.
Yes				
No				General Notes;
Do Not Know	Do Not Know			Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Score	1.5			
Dust - If there is contaminated surface soil (*e.g.,* top 1.5 m) , indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero.		Skip B if A is complete.	Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	Selected References;
Fine				Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332. http://ceqg-rcqe.ccme.ca/
Coarse				Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC
Surface soil is not contaminated or absent (bedrock)				
Do Not Know Texture				
	Do Not Know			
Score	2			
inhalation total	3.5			
B. Potential for human exposure				
iii) Ingestion (*i.e.,* ingestion of food items, water and soils [for children]), including traditional foods.		Skip B if A is complete.	Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (*e.g.,* provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure.	**Selected References:** Guidelines for Canadian Drinking Water Quality: http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php
Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future).			The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable.
0 to 100 m			For aquifers, examples of "No drinking water present" includes municipal bylaws prohibiting water wells for potable water use and naturally non-potable (*e.g.,* saline) shallow groundwater.	Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
100 to 300 m				
300 m to 1 km				
1 to 5 km				
No drinking water present				
No potential for aquifer contamination			Groundwater used for drinking water may not be at risk from contamination due to a lack of hydrological connection between contaminated soil or groundwater, or the drinking water is sufficiently up-gradient of the contamination source. Selection of "No potential for aquifer contamination" must be supported with sufficient documentation, *e.g.,* lithological and contaminant properties, well capture zones (map drawn to scale), and capture zone delineation methodology.	
Do Not Know				
	Do Not Know			
Score	2			
Is an alternative water supply readily available?		Skip B if A is complete.	Answer Not Applicable if "No drinking water present" or "No potential for aquifer contamination" was selected in previous question.	
Yes				
No				
Not Applicable				
Do Not Know	Do Not Know			
Score	0.5			
Is human ingestion of contaminated soils possible?		Skip B if A is complete.	If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Yes				
No				
Do Not Know	Do Not Know			
Score	1.5			
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings?		Skip B if A is complete.	Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (*e.g.,* large mammals may spend a very small amount of time at a small contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Ingestion total	4.5			
Human Health Total "Potential" Score	12	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	---			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (*i.e.,* food, water, shelter, etc.) in contaminated area.	No			
Yes No Do Not Know				
Human Exposure Modifying Factors - "Known"	0			
Human Exposure Modifying Factors - "Potential"	---			
Raw Human "Known" total	0			
Raw Human "Potential" total	---			
Raw Combined Total Human Score	0			
Adjusted Total Human Score (max 22)	**0**			
3. Ecological				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to terrestrial or aquatic organisms as a result of the contaminated site.	18	Based on the ecological risk assessment, adverse effects to ecological receptors exposed to COPC (metals) at the site are considered possible (Stantec, 2019).	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (*i.e.,* a priority for remediation or risk management), regardless of the numerical total NCS score. For the purpose of application of the NCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction. If ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provided in case a numerical score for the site is still desired. This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight of evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life. CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses. http://ceqg-rcqe.ccme.ca/ Sensitive receptors- review: Canadian Council on Ecological Areas; www.ccea.org Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12			
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
	18			
Score	18			
NOTE: If a score is assigned here for Known Exposure, then you should skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)				
B. Potential for ecological exposure (for the contaminated portion of the site)				
a) Terrestrial i) Land use		Skip B if A is complete.	Review zoning and land use maps. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration). Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (*e.g.,* greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
Agricultural (or Wild lands) Residential / Parkland Commercial Industrial Do Not Know				
	Do Not Know			
Score	1.5			
ii) Uptake potential		Skip B if A is complete.	If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.	
Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site? Yes No Do Not Know	Do Not Know			
Score	0.5			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
iii) Ingestion (*i.e.,* wildlife or domestic animals ingesting contaminated food items, soils or water)		Skip B if A is complete.		
Are terrestrial animals likely to be ingesting contaminated water at the site?			Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Are terrestrial animals likely to be ingesting contaminated soils at the site?			Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Can the contamination identified bioaccumulate?			Substances can be considered bioaccumulative if; • There is a Tissue Residue Guideline (TRG) or Soil Quality Guideline for Soil and Food Ingestion for the protection of secondary (SQG_{2C}) and/or tertiary consumers (SQG_{3C}). • Bioaccumulation factor (BAF) or bioconcentration factor (BCF) greater than 5000. • If BAF or BCF is not available, or reliable, the log Kow is equal to or greater than 5. If a literature review indicates that a substance biomagnifies, it should be treated as biomagnifying regardless of whether or not it meets the criteria above. It should also be noted that some substances with a log Kow greater than 5 do not biomagnify. If studies on a substance with a high Kow demonstrate a lack of biomagnification in upper trophic levels, then the substance can be considered not bioaccumulative. Petroleum hydrocarbons F1 to F4 are not considered bioaccumulative.	*See attached Reference Material including log(Kow)* Consult *CEPA (1999) Persistence and Bioaccumulation Regulations* for additional guidance; http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-107/page-1.html
Yes				
No				
Do Not Know	Do Not Know			
Score	0.5			
Distance to sensitive terrestrial ecological area			It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.
0 to 300 m				
300 m to 1 km				
1 to 5 km				
> 5 km				
Do Not Know				
	Do Not Know			
Score	1.5			
Raw Terrestrial "Potential" total	5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial "Potential" total	---			
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic		Skip B if A is complete.	"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species. "Typical aquatic environments" include those in areas other than those listed above.	
i) Classification of aquatic environment				
Sensitive				
Typical				
Not Applicable (no aquatic environment present)				
Do Not Know				
	Do Not Know			
Score	2			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
ii) Uptake potential Does groundwater daylighting to an aquatic environment exceed the CCME water quality guidelines for the protection of aquatic life at the point of contact? Yes No (or Not Applicable) Do Not Know	Do Not Know	Skip B if A is complete.	Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "peepers", in the sediments in the area of daylighting groundwater.	
Score	0.5			
Distance from the contaminated site to an important surface water resource 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know	Do Not Know	Skip B if A is complete.	It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subject to further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link: www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments.
Score	1.5			
Are aquatic species (*i.e.,* forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as mammals and birds, likely to accumulate contaminants in their tissues? Yes No Do Not Know	Do Not Know	Skip B if A is complete.	Substances can be considered bioaccumulative if; • There is a Tissue Residue Guideline (TRG) • Bioaccumulation factor (BAF) or bioconcentration factor (BCF) greater than 5000. • If BAF or BCF is not available, or reliable, the log Kow is equal to or greater than 5. If a literature review indicates that a substance biomagnifies, it should be treated as biomagnifying regardless of whether or not it meets the criteria above. It should also be noted that some substances with a log Kow greater than 5 do not biomagnify. If studies on a substance with a high Kow demonstrate a lack of biomagnification in upper trophic levels, then the substance can be considered not bioaccumulative.	*See attached Reference Material including log(Kow)* Consult *CEPA (1999) Persistence and Bioaccumulation Regulations* for additional guidance; http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-107/page-1.html
Score	0.5			
Raw Aquatic "Potential" total	4.5	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic "Potential" total	---			
4. Ecological Exposure Modifying Factors				
a) Known, or potential, occurrence of a species at risk. Is there a potential for a species at risk to be present at the site, or a known presence? Yes No Do Not Know	No 0 ---	An on-line search was conducted in 2018 and a biologist was consulted. It is considered unlikely that species at risk would be present at the site (Stantec, 2019).	Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as NatureServe Explorer (http://explorer.natureserve.org/). Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance. To assess the potential for a species at risk to be present, the site (or surroundings) should be located within range of a species at risk (using on-line resources and consultation with knowledgeable government departments or biologists, see above), and there should be an assessment of habitat suitability for any identified potential species at risk.	Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act, available at: http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1 Many provincial governments may also provide regionally applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection. http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk

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(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

Site: Border Beacon (Upper Site)

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
b) Potential impact of aesthetics (*e.g.,* enrichment of a lake or tainting of food flavour).		There is visible metal debris in and around a small localized depression on the Upper Site (Stantec, 2018; 2019).		
Is there evidence of aesthetic impact to receiving water bodies?	Yes		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	This Item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
Yes	2			
No				
Do Not Know	---			
Is there evidence of olfactory impact (*i.e.,* unpleasant smell)?	No	There's been no known reported evidence of olfactory impact (Stantec, 2018; 2019).	Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Yes	0			
No				
Do Not Know	---			
Is there evidence of increase in plant growth in the lake or water body?	No	There's been no known reported evidence of increase in plant growth in the lake or water body (Stantec, 2018; 2019).	A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients *e.g.,* nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.	
Yes	0			
No				
Do Not Know	---			
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different?	No	There's been no known reported evidence that fish or meat taken from or adjacent to the site smells or tastes different (Stantec, 2018; 2019).	Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Yes	0			
No				
Do Not Know	---			
Ecological Modifying Factors Total - Known	2			
Ecological Modifying Factors Total - Potential	---			
Raw Ecological "Known" total	20			
Raw Ecological "Potential" total	---			
Raw Combined Total Ecological Score	20			
Adjusted Total Ecological Score (Max 18)	**18**			
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)		Discontinuous permafrost (i.e., between 30% and 80% of the ground surface) may be present at the site. No roads or buildings are suspected to be dependant upon the permafrost for structural integrity (Stantec, 2018; 2019).		Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summer. Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	No		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability of the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.	
Yes	0			
No				
Do Not Know	---			
		It is unknown if there is a physical pathway that could transport soils released by damaged permafrost to a nearby aquatic environment (Stantec, 2018; 2019).		
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	Do Not Know		Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	
Yes	---			
No				
Do Not Know	1			
Other Potential Receptors Total - Known	0			
Other Potential Receptors Total - Potential	1			

Exposure Total		
Raw Human Health + Ecological Total + Other Receptors - "Known"	20	
Raw Human Health + Ecological Total + Other Receptors - "Potential"	1	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.
Raw Total Exposure Score (not adjusted)	21	HH or Eco Total score has not yet been capped at 22 and 18, respectively.
Adjusted Total Score (Adjusted Total Exposure / 46 * 34)	**14.0**	maximum 34

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Score Summary

Site: Border Beacon (Upper Site)

Scores from individual worksheets are tallied in this worksheet.
Refer to this sheet after filling out the revised NCSCS completely.

I. Contaminant Characteristics	Known	Potential
1. Residency Media	8	---
2. Chemical Hazard	8	---
3. Contaminant Exceedance Factor	6	---
4. Contaminant Quantity	2	---
5. Modifying Factors	5	---
Raw Total Score	29	---
Raw Combined Total Score (Known + Potential)	29	
Adjusted Total Score (Raw Combined Total/40*33)	**23.9**	(max 33)

II. Migration Potential	Known	Potential
1. Groundwater Movement	12	---
2. Surface Water Movement	12	---
3. Soil	12	---
4. Vapour	---	10.5
5. Sediment Movement	---	4
6. Modifying Factors	4	---
Raw Total Score	40	14.5
Raw Combined Total Score (Known + Potential)	54.5	
Adjusted Total Score (Raw Combined Total/64*33)	**28.1**	(max 33)

III. Exposure	Known	Potential
1. Human Receptors		
A. Known Impact	0	
B Potential		
a. Land Use		---
b. Accessibility		---
c. Exposure Route		
i. Direct Contact		---
ii. Inhalation		---
iii. Ingestion		---
2. Human Receptors Modifying Factors	0	---
Raw Total Human Score	0	---
Raw Combined Total Human Score (Known + Potential)	0	
Adjusted Total Human Score	0	(maximum 22)
3. Ecological Receptors		
A. Known Impact	18	
B. Potential		
a. Terrestrial		---
b. Aquatic		---
4. Ecological Receptors Modifying Factors	2	---
Raw Total Ecological Score	20	---
Raw Combined Total Ecological Score (Known + Potential)	20	
Adjusted Total Ecological Score	18	(maximum 18)
5. Other Receptors	0	1
Total Other Receptors Score (Known + Potential)	1	
Total Exposure Score (Human + Ecological + Other)	**19**	
Adjusted Total Score (Total Exposure/46*34)	**14.0**	(maximum 34)

Site Score

Site Letter Grade	**B**
Certainty Percentage	**88%**
% Responses that are "Do Not Know"	**2%**
Total NCSCS Score for site	**66.1**
Site Classification Category	**2**

Site Classification Categories*:

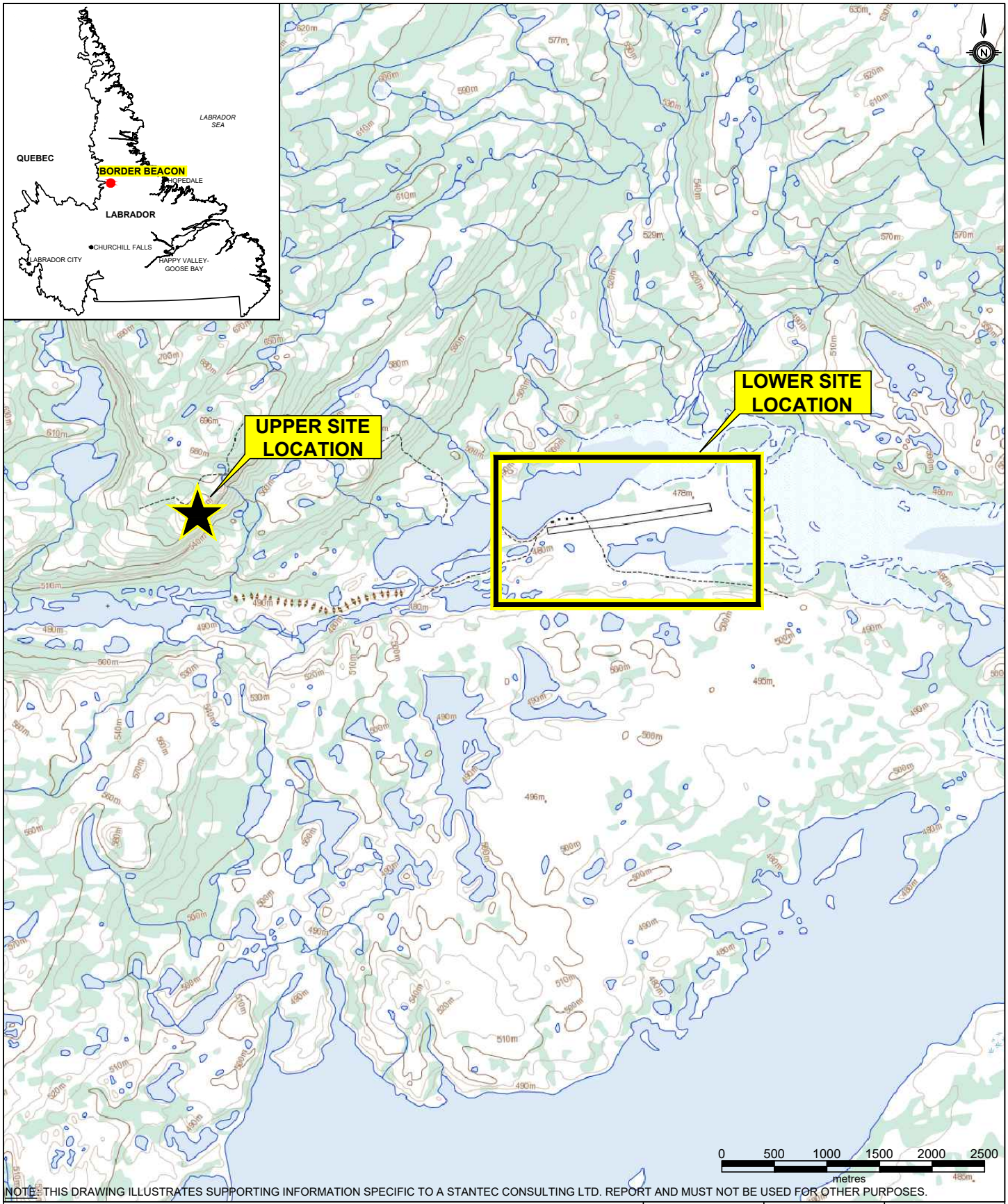
Class 1 - High Priority for Action (Total NCS Score >70)
Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
Class N - Not a Priority for Action (Total NCS Score <37)
Class INS - Insufficient Information (≥15% of responses are "Do Not Know", or a site letter grade of F has been assigned)

* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT: NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT	SCALE: 1:5,000,000	DATE: SEPT. 6, 2018	REV. No. 0
	DRAWN BY: N.M.	EDITED BY: -	CHECKED BY: J.S.
PROJECT TITLE: PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL	DRAWING No: 121414998-EE-01	CAD FILE: 121414998-EE-01.DWG	
DRAWING TITLE: SITE LOCATION PLAN	Stantec		

06SEP18 9:00AM



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:
NEWFOUNDLAND AND LABRADOR
DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SITE LOCATION PLAN - BORDER BEACON

SCALE:	DATE:	REV. No.
1:50,000	SEPT. 6, 2018	0
DRAWN BY:	EDITED BY:	CHECKED BY:
N.M.	-	J.S.
DRAWING No:	CAD FILE:	
121414998-EE-02	121414998-EE-02.DWG	

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LEGEND

- SURFACE SOIL SAMPLE (STANTEC 2018)
- VEGETATION / BERRY SAMPLE (STANTEC 2018)
- TEST PIT (STANTEC 2017)
- SURFACE SOIL SAMPLE (STANTEC 2017)
- VEGETATION / BERRY SAMPLE (STANTEC 2017)
- SEDIMENT SAMPLE (STANTEC 2017)
- SURFACE WATER SAMPLE (STANTEC 2017)
- PHC EXCEEDANCE IN SOIL OR SEDIMENT
- PAH EXCEEDANCE IN SEDIMENT
- METALS EXCEEDANCE IN SOIL OR SURFACE WATER

TOWER
BB-SS50
BURIED METAL DEBRIS
BB-SS49
FORMER ANTENNA TOWER
BB-SS47
FORMER EMERGENCY SHELTER BUILDING
BB-VEG8
BB-TP42
2018-VEG09
2018-SS31
2018-SS30
2018-SS32
BB-SS46
2018-SS37
2018-SS33
FORMER ANTENNA TOWER
2018-SS36
2018-SS34
2018-SS35
2018-SS47
2018-SS42
BB-TP43
2018-VEG10
4 FORMER 9,547L DIESEL ASTs
BB-TP41
FORMER ANTENNA TOWER
BB-SS48
BB-TP40
2018-SS46
BB-TP39
BB-TP44
2018-SS43
5 FORMER 6,818L DIESEL ASTs
BB-SS45
BB-SS44
2018-VEG11
2018-SS45
2018-SS48
FORMER OPERATIONS BUILDING
2018-SS44
BB-VEG9
2018-SS39
FORMER ANTENNA TOWER
2018-SS38
BB-SS43
BB-SED5
2018-SS40
BB-SW5
2018-SS41
0 10 20 30 40 50
metres

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:
NEWFOUNDLAND AND LABRADOR DEPARTMENT OF MUNICIPAL AFFAIRS AND ENVIRONMENT

PROJECT TITLE:
PHASE III ENVIRONMENTAL SITE ASSESSMENT AND HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SITE 212, BORDER BEACON, NL

DRAWING TITLE:
SAMPLING AND EXCEEDANCE (SOIL, SURFACE WATER, SEDIMENT) PLAN - UPPER SITE

SCALE:	DATE:	REV. No.
1:800	APR. 12, 2019	0
DRAWN BY: C.F.	EDITED BY: S.A.	CHECKED BY: J.S.
DRAWING No: 121414998-EE-11	CAD FILE: 121414998-EE-11DWG	

Stantec

12APR19 2:00PM