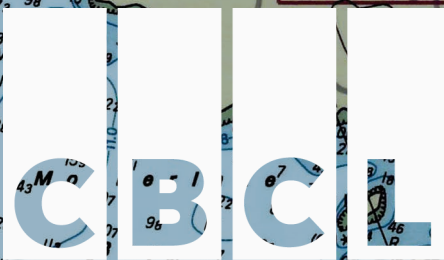


MARINE ATLANTIC INC.

Port aux Basques Harbour Navigation Improvement Project Surface Soil Sampling Report Port aux Basques, NL

Final



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Acronyms and Abbreviations

CALA	Canadian Association for Laboratory Accreditation
CBCL	CBCL Limited
CCME	Canadian Council Ministers of Environment
CEPA	Canadian Environmental Protection Act
MAI	Marine Atlantic Inc.
mbgs	metres below ground surface
NL	Newfoundland and Labrador
NS	Nova Scotia
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PHCs	Petroleum Hydrocarbons
QA/QC	Quality Assurance/Quality Control
RBCA	Risk Based Corrective Action
RDL	Reportable Detection Limit
RPD	Relative Percent Difference
SAR	Sodium Adsorption Ratio
SCC	Standards Council of Canada
SQGs	Soil Quality Guidelines
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons

Marine Atlantic Inc. (MAI) is proposing improvements to the navigation conditions in Port aux Basques Harbour, NL (the Project). The proposed navigational improvements in the harbour involve realignment of the navigation channel and the establishment of a new turning basin. Activities required to achieve these navigational improvements include deepening the realigned channel and new turning basin, removal of Vardy's Island, partial removal of Baldwin Rock, re-use and/or disposal of the dredged and excavated material, and relocation of navigational aids.

CBCL Limited (CBCL) conducted a surface soil sampling program to characterize the overburden associated with the terrestrial portion of Vardy's Island. This characterization included the determination of contaminant concentrations, as well as grain-size and total organic carbon (TOC) concentrations.

The initial surface soil sampling program was completed by CBCL on October 22, 2019, and generally included the collection of nine soil samples from shallow soils present on Vardy's Island, located in Port aux Basques, Newfoundland and Labrador (NL). A supplemental soil sampling program was completed on July 23, 2020 and included the collection of four additional composite soil samples from overburden soils on Vardy's Island to further evaluate land-based disposal options.

1.1 Scope and Methodology

On October 22, 2019, a total of nine surface soil samples (VI-01 to VI-09) were collected at select locations across Vardy's Island. Due to shallow overburden encountered on-site, the surface soil samples were collected at depths of approximately 0 – 0.15 metres below ground surface (mbgs) using a pre-cleaned soil auger. On July 23, 2020, a total of four composite soil samples (VI-10 to VI-13) were collected at select locations across Vardy's Island. The soil samples were collected from depths of surface to bedrock (approximately 0.38 – 0.76 mbgs) using a pre-cleaned soil auger.

All soil samples were placed in laboratory supplied clean glass jars and stored inside a cooler with ice for delivery to the laboratory. To minimize the potential for cross-contamination, all sampling equipment was thoroughly decontaminated between each sample location.

The surface soil sample locations are provided in Figure 1 in Appendix A. Photographs taken during the surface soil sample program are included in Appendix B.

1.1.1 Laboratory Program

Based on field observations (i.e., overburden was shallow and generally consistent across the site), only five of the soil samples collected in October 2019 (VI-02, VI-04, VI-06, VI-07 and VI-09) were submitted for laboratory analysis. The five select soil samples were submitted to Bureau Veritas laboratory in Sydney, Nova Scotia (NS) for petroleum hydrocarbons (PHCs), metals, polycyclic aromatic hydrocarbons (PAHs), sodium adsorption ratio (SAR), conductivity and TOC analysis. Grain size analysis was requested for one sample (VI-07). To remove interference from organic materials, silica gel clean-up was also requested for each sample.

All four soil samples (VI-10, VI-11, VI-12 and VI-13) collected during the July 2020 field program were submitted for laboratory analysis. One soil sample VI-10 was submitted to Bureau Veritas laboratory in Sydney, NS for leachable metals, leachable PAHs and PCB analysis. The other three soil samples (VI-11, VI-12 and VI-13) were submitted to Bureau Veritas laboratory in Sydney, NS for PHCs, metals, PAHs and PCB analysis. To remove interference from organic materials, silica gel clean-up was also requested for the samples submitted for PHC analysis.

Bureau Veritas is accredited by the Standards Council of Canada (SCC) to criteria set by the Canadian Association for Laboratory Accreditation (CALA) for each of the analytical methods utilized, and has in-house QA/QC protocols to govern sample analysis, including replicates. All analyses performed by Bureau Veritas are accredited to ISO/IEC 17025 standards (and subsequent revisions).

The laboratory analytical results are discussed in Chapter 3 and tabulated in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

1.1.2 QA/QC Program

Industry standard sampling protocols were followed to ensure accuracy and precision of results. This included decontamination procedures, the collection of a Quality Assurance/Quality Control (QA/QC) sample, labelling, preserving, completed Chain of Custody forms, packaging and QA/QC procedures in the laboratory. During fieldwork, various QA/QC measures were undertaken in accordance with industry standards, including the following:

- Collection of one blind field duplicate sample
- Cleaning of the soil auger between sampling locations
- Maintaining a clean work area for sample handling/logging
- Use of disposable nitrile gloves when handling samples
- Use of laboratory-supplied/prepared containers for samples
- Keeping samples in cool storage in a secure location and maintaining direct custody of samples until delivery to the laboratory

All samples were labelled indicating sample identification and date, and were delivered to the laboratory within the recommended hold times. Field QA/QC was addressed by the collection of one blind field duplicate sample, including:

- VI-DUP is a blind field duplicate of soil sample VI-04 collected on October 22, 2019.

The results of this testing were used to evaluate the reliability of the sampling methods. Laboratory QA/QC included laboratory duplicates, laboratory matrix spikes, method blanks, and surrogate recoveries. QA/QC results are provided in Section 3.3, Tables C.7 to C.11 in Appendix C and on the laboratory Certificates of Analysis provided in Appendix D.

To facilitate the evaluation of disposal options, the soil analytical results were compared to the following guidelines:

- The Canadian Council Ministers of Environment (CCME) Soil Quality Guidelines (SQGs) for the Protection of Environmental and Human Health in agricultural, residential/parkland, and commercial/industrial applications
- Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines
- Newfoundland and Labrador Department of Environment and Conservation Protocol for the Management of Excavated Soils, Concrete, Rubble and Dredged Materials
- Newfoundland and Labrador Department of Environment, GD-PPD-26.1 - Leachable Toxic Waste, Testing and Disposal
- Atlantic Risk Based Corrective Action (RBCA) Version 3.0 Tier 1 Risk-Based Screening Levels (RBSLs) for PHCs

3.1 Field Observations

Soils encountered during the surface soil sampling programs generally consisted of dark brown peat and silty sand with organics and roots. The overburden encountered was shallow, extending to a maximum depth of approximately 0.76 mbgs. There was no free product and no visual or olfactory evidence of PHC impacts observed at any of the sample locations. Photographs taken during the surface soil sampling program are provided in Appendix B.

Based on observations made during the surface soil sampling program, in conjunction with the geotechnical program (reported under separate cover), it is estimated that there is approximately 17,250 m³ of overburden material that will require to be removed and disposed of at an approved disposal facility.

3.2 Soil Analytical Results

A total of six soil samples (VI-02, VI-04, VI-06, VI-07, VI-09 and one blind field duplicate sample (VI-DUP)) were submitted for laboratory analysis of PHCs (RBCA and CCME methodology), metals, PAHs, SAR, electrical conductivity and TOC during the October 2019 field program.

During the July 2020 field program, a total of four soil samples (VI-10, VI-11, VI-12 and VI-13) were submitted for laboratory analysis. One soil sample (VI-10) was submitted for laboratory analysis of leachable metals, leachable PAHs and PCBs. The other three soil samples (VI-11, VI-12 and VI-13) were submitted for laboratory analysis of PHCs (RBCA methodology), metals, PAHs and PCBs.

The analytical results are provided in Tables C.1 to C.9 in Appendix C. The soil sample locations with reported exceedances are illustrated on Figure 2 in Appendix A.

3.2.1 PHCs in Soil

The concentrations of F3 hydrocarbons exceeded the CCME CWS Agricultural and Residential/Parkland criteria at three sample locations, including VI-02, VI-06 and VI-09. CCME Commercial and Industrial criteria for PHCs in soils were not exceeded. All other PHC concentrations were non-detect or reported below the guidelines.

The analytical results for PHCs in soil are provided in Table C.1 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.2 Metals in Soil

The concentrations of lead exceeded the CCME SQGs for Agricultural and Residential/Parkland criteria at three sample locations, including VI-02, VI-04 and VI-06. Concentrations of lead also exceeded the CCME SQGs Commercial criteria at one sample location, including VI-04. The concentrations of selenium exceeded the CCME SQGs for Agricultural and Residential/Parkland criteria at seven sample locations, including VI-02, VI-04, VI-06, VI-07, VI-09, VI-11 and VI-13. All other metals concentrations were non-detect or reported below the guidelines.

The analytical results for metals in soil are provided in Table C.2 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.3 Leachate Metals in Soil

The concentrations of leachable metals from soil sample VI-10 were either non-detect or reported below the NL leachate disposal criteria.

The analytical results for leachable metals in soil are provided in Table C.3 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.4 PAHs in Soil

The concentrations of various PAH parameters exceeded the CCME SQGs Agricultural criteria at three sample locations, including VI-04, VI-06 and VI-09. PAH parameters exceeded the CCME SQGs Commercial and Industrial criteria at two sample locations, including VI-04 and VI-09. Total PAHs were also reported to exceed the CEPA Disposal at Sea Guidelines at sample location VI-04. All other PAH concentrations were non-detect or reported below the guidelines.

The analytical results for PAHs in soil are provided in Table C.4 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.5 Leachate PAHs in Soil

The concentrations of leachable PAHs from soil sample VI-10 were either non-detect or reported below the NL leachate disposal criteria.

The analytical results for leachable PAHs in soil are provided in Table C.5 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.6 PCBs in Soil

The concentrations of PCBs were reported as non-detect and below the guidelines in all four of the analyzed soil samples.

The analytical results for PCBs in soil are provided in Table C.6 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.7 SAR and Electrical Conductivity in Soil

The concentrations of SAR and electrical conductivity were reported below the guidelines in all five of the analyzed soil samples.

The analytical results for SAR and conductivity in soil are provided in Table C.7 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.8 Total Organic Carbon in Soil

The concentrations of TOC were generally consistent, ranging from 490,000 to 530,000 mg/kg in the analyzed samples. There are no regulatory guidelines for TOC in soil.

The analytical results for TOC in soil are provided in Table C.8 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.2.9 Grain Size in Soil

Soil sample VI-07 was submitted for grain size analysis and was predominantly clay. The analytical results for grain size in soil are provided in Table C.9 in Appendix C. The laboratory Certificates of Analysis are provided in Appendix D.

3.3 QA/QC Results

QA/QC sampling consisted of the collection and analysis of one blind field duplicate during the soil sampling program, including:

- Soil sample VI-DUP, collected at the same location of VI-04, was submitted for analysis of PHCs, metals, PAHs, SAR, conductivity and TOC.

QA/QC analytical results are presented in Appendix C, including Tables C.10 (PHCs), C.11 (Metals), C.12 (PAHs), C.13 (SAR and conductivity) and C.14 (TOC), where the duplicate information is presented along with the original sample data for comparison. The purpose of the blind duplicate was to determine the integrity of the samples.

The relative percent difference (RPD) between a sample and its duplicate is expressed as an absolute value in the tables, and was calculated using the following formula:

$$RPD = 100\% \times [(A - B) / ((A + B) / 2)]$$

Where, A = Original concentration

B = Duplicate concentration

RPD calculations are only considered applicable when one concentration is greater than five times the laboratory Reportable Detection Limits (RDLs). When one (or both) values are less than the RDL, the RPD is not calculated.

In reviewing the RPD calculations for the soil samples as related to blind duplicate samples, it has been observed that the duplicate results generally agree closely with their corresponding samples. Acceptable limits for RPD (i.e., high vs. low degree of correlation) are based on the Bureau Veritas Analytical Laboratories National QA/QC Interpretation Guide. The general alert criteria for soil is 60%. These are recommended alert criteria, but results outside these limits may be deemed acceptable on a case by case basis. With the exception of various PAH parameters, all calculated RPDs were within 60%. It is important to note that RPD calculations are only applicable when both concentrations are greater than five times the laboratory RDL. Based on the review of field duplicates, the overall laboratory and field data quality is considered acceptable.

Bureau Veritas has an extensive QA/QC program that includes a Quality Assurance Report with all analyses (see Appendix D), which provides Percent Recoveries and QC Limits on Matrix Spikes, Spiked Blanks, Method Blanks and Lab Duplicates. Several laboratory blank samples were analyzed with the sample sets to assess the quality of the laboratory results with respect to the presence/absence of instrument cross contamination at the laboratory. Surrogate recoveries were also reviewed for samples to evaluate the effectiveness and accuracy of the method on a sample-specific basis. Based on the review of QA reports, laboratory duplicates, blanks and surrogate recoveries, all laboratory QA/QC standards were within acceptable limits.

Soils encountered during the surface soil sampling program generally consisted of dark brown peat and silty sand with organics and roots. The overburden encountered at the soil sample locations was shallow, extending to a maximum depth of approximately 0.76 mbgs. Based on observations made during the surface soil sampling program, in conjunction with the geotechnical program (reported under separate cover), it is estimated that there is approximately 17,250 m³ of overburden material that will require to be removed and disposed of at an approved disposal facility.

The reported CCME SQG exceedances for Agricultural and Residential/Parkland land uses included PHCs (F3 fraction), metals (lead and selenium) and/or various PAH parameters at all sample locations with the exception of VI-10 and VI-12. Exceedances of the CCME SQGs for Commercial land use included metals (lead) at one sample location (VI-04) and PAHs at two sample locations (VI-04 and VI-09). Concentrations of PCBs were non-detect and below applicable guidelines at the four soil sample locations.

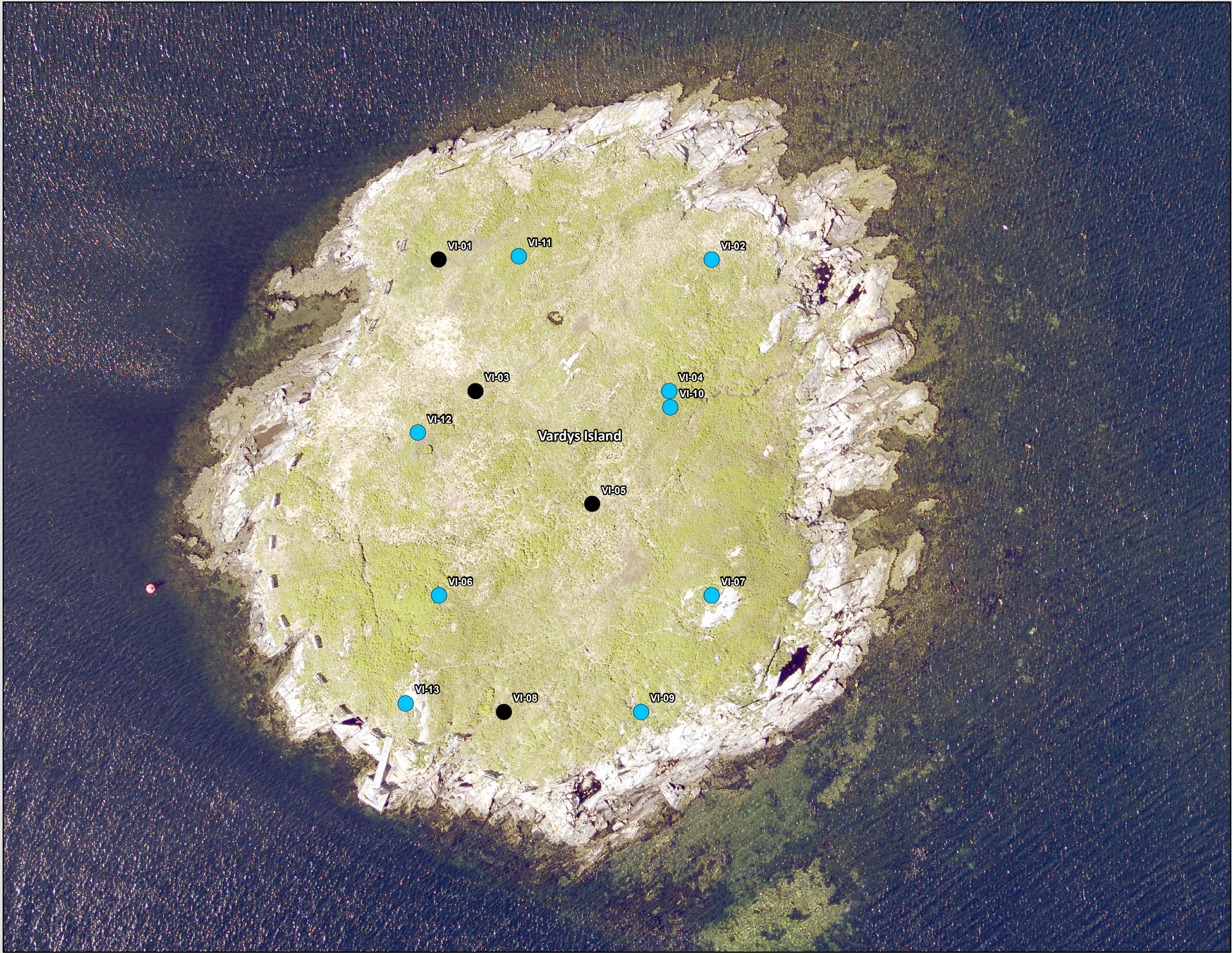
In accordance with the Newfoundland Department of Environment and Conservation Protocol for the Management of Excavated Soils, Concrete Rubble and Dredged Materials, an additional soil sample was collected in the vicinity of sample location VI-04 and submitted for laboratory analysis of metals and PAHs leachate (Toxicity Characteristic Leaching Procedure (TCLP)). There were no reported exceedances of the NL leachate disposal criteria. In addition, there were no reported exceedances of the NL criteria of 1,000 mg/kg for modified total petroleum hydrocarbons (TPH). Therefore, it is expected that the overburden material can be disposed of at a licensed disposal facility in NL.

References

- Atlantic PIRI. 2015. Atlantic Risk-Based Corrective Action (RBCA) for Petroleum Impacted Sites in Atlantic Canada, Version 3.0 User Guidance. Table 41 - Tier 1 Risk-Based Screening Levels (RBSLs) for Soil.
- Canadian Council of Ministers of the Environment (CCME). (2008). Canada-Wide Standards for Petroleum Hydrocarbons in Soil. Technical Supplement.
- CCME Canadian Environmental Quality Guidelines Summary Table. Soil Quality. Available Online: <http://st-ts.ccme.ca/>. Accessed November 2019.
- CCME Canadian Soil Quality Guidelines for Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs): Environmental and Human Health Effects, 2008.
- Newfoundland and Labrador Department of Environment, GD-PPD-26.1 - Leachable Toxic Waste, Testing and Disposal (Revised November 2003).
- Newfoundland and Labrador Department of Environment and Conservation Protocol for the Management of Excavated Soils, Concrete Rubble and Dredged Materials, June 9, 2006 (Revised May 26, 2015).

APPENDIX A

Figures



Soil Sample Locations

- Soil Sample Not Submitted for Analysis
- Soil Sample Submitted for Analysis

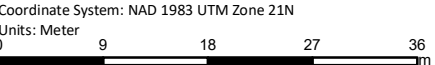


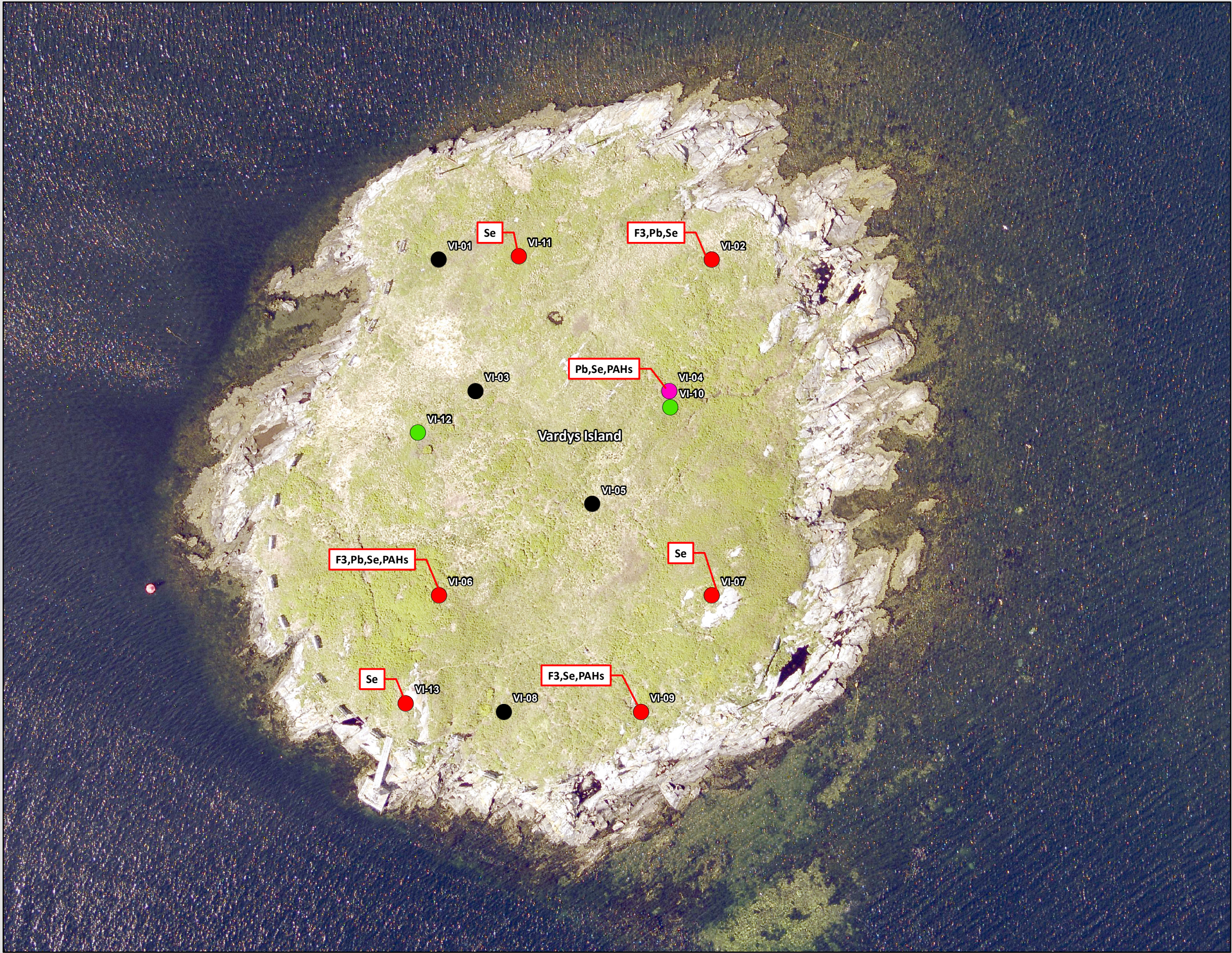
MARINE ATLANTIC INC.
Navigation Improvement Project
Port aux Basques, Newfoundland and Labrador

Figure 1: Vardys Island Soil Sample Locations

Drawn by: RM	Date: 2020-08-28
Checked:	CBCL Project #: 192479.45
Approved:	Scale @ 11" x 17" : 1:650

Notes:
F3 = >C16-C34 HYDRPCARBONS
Pb = LEAD
Se = SELENIUM
PAHs = POLYCYCLIC AROMATIC HYDROCARBONS





Soil Sample Locations

- Soil Sample Not Submitted for Analysis
- Soil Sample Meets Guidelines
- Soil Sample Exceeds CCME Guidelines
- Soil Sample Exceeds CCME and Dsiposal at Sea (DAS) Guidelines (PAHs Only)

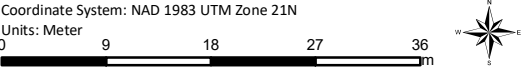


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Navigation Improvement Project
Port aux Basques, Newfoundland and Labrador

Figure 2: Vardys Island Soil Sample Locations and Exceedances

Drawn by: RM	Date: 2020-08-28
Checked:	CBCL Project #: 192479.45
Approved:	Scale @ 11" x 17" : 1:650

Notes:
F3 = >C16-C34 HYDRPCARBONS
Pb = LEAD
Se = SELENIUM
PAHs = POLYCYCLIC AROMATIC HYDROCARBONS



Y:\Halifax\HeavyData\192479_45 VARDYS ISLAND ENVIRONMENTAL\192479_45 MAD-001 - FIG 2 - SOIL SAMPLE EXCEEDANCES.mxd

APPENDIX B

Photographs

Appendix B: Photo Log



Photo 1: General site photo

Appendix B: Photo Log



Photo 2: General sample area



Photo 3: Soil sample location VI-01

Appendix B: Photo Log



Photo 4: Soil sample location VI-02



Photo 5: Soil sample location VI-03

Appendix B: Photo Log



Photo 6: Soil sample location VI-04 (and blind field duplicate)



Photo 7: Soil sample location VI-05

Appendix B: Photo Log



Photo 8: Soil sample location VI-06



Photo 9: Soil sample location VI-07

Appendix B: Photo Log



Photo 10: Soil sample location VI-08



Photo 11: Soil sample location VI-09

Appendix B: Photo Log



Photo 12: Soil sample location VI-11



Photo 13: Soil sample location VI-12

APPENDIX C

Analytical Tables

Table C.1: Petroleum Hydrocarbons (PHCs) in Soil (mg/kg)

Sample ID: Depth (m): Sampling date:		CCME SQGs ^a Agricultural, Residential/Parkland, Commercial, Industrial	CCME CWS ^b Agricultural, Residential/ Parkland Commercial, Industrial		NL MAE ^c All Land Uses	RBCA Tier I RBSLs ^d Agricultural, Residential/ Parkland Commercial, Industrial		Vardys Island - PAB Navigation Improvements Project									
								VI-02	VI-04	VI-DUP (Field Duplicate of VI-04)	VI-06	VI-07	VI-09	VI-11	VI-12	VI-13	
								0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.38	0 - 0.41	0 - 0.76	
								22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	23-Jul-20	23-Jul-20	23-Jul-20	
Petroleum Hydrocarbons																	
Benzene		0.030	-	-	-	0.099	2.5	<0.018	<0.050	<0.050	<0.018	<0.050	<0.024	<0.050	<0.025	<0.050	
Toluene		0.37	-	-	-	77	10,000	<0.030	<0.10	<0.10	<0.030	<0.10	<0.040	<0.10	<0.050	<0.10	
Ethylbenzene		0.082	-	-	-	30	10,000	<0.060	<0.050	<0.050	0.073	<0.050	<0.080	<0.050	<0.025	<0.050	
p+m-Xylene		11	-	-	-	8.8	110	<0.060	-	-	<0.060	-	<0.080	-	-	-	
o-Xylene			-	-	-			-	<0.060	-	-	<0.060	-	<0.080	-	-	
Total Xylenes			-	-	-			-	<0.060	<0.10	<0.10	<0.060	<0.10	<0.080	<0.10	<0.050	<0.10
C6-C10 (less BTEX) [F1]		-	30	320	-	-	-	<60	<5.0	<5.0	<70	<5.0	<70	<5.0	<2.5	<5.0	
>C10-C16 Hydrocarbons		-	-	-	-	-	-	<60	<10	<10	<70	<10	<70	<10	<10	<10	
>C16-C21 Hydrocarbons		-	-	-	-	-	-	-	<10	<10	-	<10	-	<10	<10	<10	
>C21-<C32 Hydrocarbons		-	-	-	-	-	-	-	270	230	-	150	-	150	180	220	
Modified TPH (Tier1)		-	-	-	1000	74 (Gas) 270 (Fuel) 1,100 (Lube)	870 (Gas) 4,000 (Fuel) 10,000 (Lube)	-	270	230	-	150	-	150	180	220	
Reached Baseline at C32		-	-	-	-	-	-	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	
Resemblance		-	-	-	-	-	-	-	Unidentified compound(s) in lube oil range.	Unidentified compound(s) in lube oil range.	-	Unidentified compound(s) in lube oil range.	-	Unidentified compound(s) in lube oil range.	Unidentified compound(s) in lube oil range.	Unidentified compound(s) in lube oil range.	
F2-F4 Hydrocarbons																	
F2	>C10-C16 Hydrocarbons	-	150	260	-	-	-	<40	-	-	<50	-	<50	-	-	-	
F3	>C16-C34 Hydrocarbons	-	300	1700	-	-	-	1000 ²	-	-	910 ²	-	790 ²	-	-	-	
F4	>C34-C50 Hydrocarbons	-	2800	3300	-	-	-	390	-	-	360	-	340	-	-	-	
F4G-sg		>C50 Hydrocarbons	-	-	-	-	-	1500	-	-	3200	-	1800	-	-	-	
Reached Baseline at C50		-	-	-	-	-	-	No	-	-	No	-	No	-	-	-	

Notes:

'-' = No guideline available or parameter not analyzed

<RDL in grey text

RDL = Reportable Detection Limit

a. CCME Soil Quality Guidelines (SQG), Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (Updated to 2019)

b. CCME Canada Wide Standards (CWS) for Petroleum Hydrocarbons in Soil, Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (January 2008)

c. Newfoundland and Labrador Department of Environment and Conservation Protocol for the Management of Excavated Soils, Concrete Rubble and Dredged Materials (June 9, 2006; revised May 26, 2015).

d. Atlantic Risk Based Corrective Action (RBCA) Tier I Risk Based Screening Levels (RBSLs) for Soil for all land use types, non-potable and coarse-grained soil (September 2015).

e. The Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines (formerly the Ocean Dumping Control Act) were checked, but no guidelines exist for petroleum hydrocarbons.

Exceedance Identification:

Shaded = Exceedance of Guideline

1 - exceeds CCME SQGs

4 - exceeds NL MAE

2 - exceeds CCME CWS Agricultural, Residential/Parkland

5 - exceeds RBCA Tier 1 RBSLs Agricultural,Residential/Parkland

3 - exceeds CCME CWS Commercial, Industrial

6 - exceeds RBCA Tier 1 RBSLs Commercial, Industrial

Table C.2: Metals in Soil (mg/kg)

Sample ID: Depth (m): Date:	CCME SQGs ^a				CEPA Disposal at Sea Regulations ^b	Vardys Island - PAB Navigation Improvements Project								
						VI-02	VI-04	VI-DUP (Field Duplicate of VI-04)	VI-06	VI-07	VI-09	VI-11	VI-12	VI-13
	Agricultural	Residential/ Parkland	Commercial	Industrial		0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.38	0 - 0.41	0 - 0.76
						22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	23-Jul-20	23-Jul-20	23-Jul-20
Aluminum	-	-	-	-	-	2000	2800	2100	1000	800	5500	3100	3700	3000
Antimony	20	20	40	40	-	<2.0	<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	12	12	12	12	-	2.5	3.2	4.2	2.9	<2.0	2.4	<2.0	<2.0	<2.0
Barium	750	500	2000	2000	-	36	10	12	92	6.8	23	8.4	9.5	8.8
Beryllium	4	4	8	8	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	-	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	2	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium	1.4	10	22.0	22	0.6	0.52	<0.30	0.45	0.32	<0.30	0.32	<0.30	<0.30	0.37
Chromium	64	64	87	87	-	3.1	6.8	6.0	3.0	<2.0	8.4	4.1	8.6	2.3
Cobalt	40	50	300	300	-	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0
Copper	63	63	91	91	-	13	8.4	11	28	2.7	14	8.9	4.7	2.8
Iron	-	-	-	-	-	3200	3100	3700	2300	1400	4500	2700	1300	1000
Lead	70	140	260	600	-	89 ^{1,2}	270 ^{1,2,3}	310 ^{1,2,3}	89 ¹	5	68	37	8	11
Lithium	-	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Manganese	-	-	-	-	-	38	16	29	9.5	4.9	27	9.3	19	8.8
Mercury	6.6	6.6	24	50	0.75	0.21	0.26	0.32	0.22	<0.10	0.17	0.19	0.12	0.13
Molybdenum	5	10	40	40	-	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	<2.0	<2.0
Nickel	45	45	89	89	-	5.9	3.3	4.4	4.9	<2.0	6.0	3.0	<2.0	<2.0
Rubidium	-	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium	1	1	2.9	2.9	-	1.6 ^{1,2}	1.9 ^{1,2}	2.0 ^{1,2}	1.6 ^{1,2}	1.1 ^{1,2}	1.6 ^{1,2}	1.6 ^{1,2}	<0.50	1.3 ^{1,2}
Silver	20	20	40	40	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Strontium	-	-	-	-	-	88	190	250	94	66	44	66	12	94
Thallium	1	1	1	1	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	5	50	300	300	-	1.4	<1.0	1.5	1.3	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	23	23	33	300	-	0.39	1.1	1.3	0.6	0.28	0.42	0.46	0.49	0.18
Vanadium	130	130	130	130	-	18	11	11	20	3.5	18	12	18	4.3
Zinc	250	250	410	410	-	42	33	54	32	17	44	26	10	16

Notes:
'-' = No guideline available or parameter not analyzed <RDL in grey text
RDL = Reportable Detection Limit

a. CCME Soil Quality Guidelines (SQG), Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (Updated to 2019)
b. Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines (formerly the Ocean Dumping Control Act), (Current to March 12, 2019).

Exceedance Identification:
Shaded = Exceedance of Guideline
1 - exceeds CCME SQGs Agricultural
2 - exceeds CCME SQGs Residential/Parkland
3 - exceeds CCME SQGs Commercial
4 - exceeds CCME SQGs Industrial
5 - exceeds CEPA Disposal at Sea

Table C.3: Metals Leachate in Soil (ug/L)

Sample ID: Depth (m): Date:	NL Leachate Disposal Criteria ^a	Vardys Island - PAB Navigation Improvements Project
		VI-10
		0 - 0.43
		23-Jul-20
Leachable Aluminum (Al)	-	1500
Leachable Antimony (Sb)	-	<20
Leachable Arsenic (As)	2500	<20
Leachable Barium (Ba)	100000	66
Leachable Beryllium (Be)	-	<20
Leachable Boron (B)	500000	<500
Leachable Cadmium (Cd)	500	<3.0
Leachable Calcium (Ca)	-	8800
Leachable Chromium (Cr)	5000	<20
Leachable Cobalt (Co)	-	<10
Leachable Copper (Cu)	-	<20
Leachable Iron (Fe)	-	530
Leachable Lead (Pb)	5000	6.9
Leachable Lithium (Li)	-	<20
Leachable Magnesium (Mg)	-	4300
Leachable Manganese (Mn)	-	<20
Leachable Molybdenum (Mo)	-	<20
Leachable Nickel (Ni)	-	<20
Leachable Potassium (K)	-	1700
Leachable Selenium (Se)	1000	<10
Leachable Silver (Ag)	-	<5.0
Leachable Strontium (Sr)	-	96
Leachable Thallium (Tl)	-	<1.0
Leachable Tin (Sn)	-	<20
Leachable Uranium (U)	10000	<1.0
Leachable Vanadium (V)	-	<20
Leachable Zinc (Zn)	-	65

Notes:

'-' = No guideline available or parameter not analyzed

RDL = Reportable Detection Limit

a. NL Leachate Disposal Criteria = Newfoundland and Labrador Department of Environment, GD-PPD-26.1 - Leachable Toxic Waste, Testing and Disposal, 2003.

Exceedance Identification:

Shaded

 = Exceedance of Guideline

1 - exceeds NL Leachate Disposal Criteria

Table C.4: Polycyclic Aromatic Hydrocarbons (PAHs) in Soil (mg/kg)

Sample ID: Depth (m): Date:	CCME SQGs ^a			CEPA Disposal at Sea Regulations ^b	PEFs (for B(a)P TPE calculations	Vardys Island - PAB Navigation Improvements Project								
						VI-02	VI-04	VI-DUP (Field Duplicate of VI-04)	VI-06	VI-07	VI-09	VI-11	VI-12	VI-13
	0 - 0.15	0 - 0.15	0 - 0.15			0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.38	0 - 0.41	0 - 0.76			
	22-Oct-19	22-Oct-19	22-Oct-19			22-Oct-19	22-Oct-19	22-Oct-19	23-Jul-20	23-Jul-20	23-Jul-20			
Non-Carcinogenic PAHs														
1-Methylnaphthalene	-	-	-	-	-	<0.010	0.037	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	-	-	-	-	-	<0.010	0.049	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	-	-	-	-	-	<0.010	0.072	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	-	-	-	-	-	<0.010	0.95	0.091	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	2.5	2.5	32	-	-	<0.010	9.9 ^{1,2}	0.37	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	50	50	180	-	-	<0.010	75 ^{1,2}	4.8	0.13	<0.010	0.18	0.049	0.043	<0.010
Fluorene	-	-	-	-	-	<0.010	0.18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	0.013	0.013	0.013	-	-	<0.010	0.13 ^{1,2,3}	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Perylene	-	-	-	-	-	<0.010	6.2	0.32	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	0.046	0.046	0.046	-	-	<0.010	36 ^{1,2,3}	1.6 ^{1,2,3}	0.076	<0.010	0.094 ^{1,2,3}	<0.010	<0.010	<0.010
Pyrene	0.1	10	100	-	-	<0.010	67 ^{1,2}	4.1 ¹	0.10	<0.010	0.13 ¹	<0.010	<0.010	<0.010
Carcinogenic PAHs														
Benzo(a)anthracene	0.1	1	10	-	0.1	<0.010	33 ^{1,2,3}	1.9 ^{1,2}	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	-	-	-	-	1	<0.010	25	1.4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	0.1	1	10	-	0.1	<0.010	21 ^{1,2,3}	1.5 ^{1,2}	0.11 ¹	<0.010	0.083	<0.010	<0.010	<0.010
Benzo(b,j)fluoranthene	0.1	1	10	-	0.1	<0.020	32 ^{1,2,3}	2.2 ^{1,2}	0.17 ¹	<0.020	0.083	<0.020	<0.020	<0.020
Benzo(j)fluoranthene	0.1	1	Benzo(j)fluoranthene	-	0.1	<0.010	15 ^{1,2,3}	0.79 ¹	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	0.1	1	10	-	0.1	<0.010	11 ^{1,2,3}	0.77 ¹	0.052	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(ghi)perylene	-	-	-	-	0.01	<0.010	11	0.68	0.055	<0.010	0.060	<0.010	<0.010	<0.010
Chrysene	-	-	-	-	0.01	<0.010	33	2.2	0.12	<0.010	0.11	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	0.1	1	10	-	0.1	<0.010	13 ^{1,2,3}	0.71 ¹	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenzo(a,h)anthracene	0.1	1	10	-	1	<0.010	3.4 ^{1,2}	0.19 ¹	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total PAHs Calculation	-	-	-	2.5	-	0.1	339.63 ⁴	20.33 ⁴	0.7	0.1	0.7	0.1	0.1	0.1
B(a)P TPE ^d	5.3	5.3	5.3	-	-	<0.04	124.02 ^{1,2,3}	7.22 ^{1,2,3}	0.14	<0.04	0.09	<0.04	<0.04	<0.04

Notes:
'-' = No guideline available or parameter not analyzed
RDL = Reportable Detection Limit

<RDL in grey text
B[a]P PEF = Benzo(a)pyrene Potency Equivalent Factor.

B[a]P TPE = Benzo(a)pyrene Total Potency Equivalent concentration.

- a. CCME Soil Quality Guidelines (SQG), Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (Updated to 2018)
b. Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines (formerly the Ocean Dumping Control Act), (Current to March 12, 2019).

c. Total PAH calculation based on the sum of 16 individual PAH compounds (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, ideno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene)

d. The B[a]P TPE is calculated by multiplying the concentration of each PAH in the sample by its B(a)P PEF and summing the products as per CCME PAH Factsheet (2010). If the concentration is less than the RDL, 1/2 RDL is used in the B[a]P TPE calculations.

Exceedance Identification:
Shaded = Exceedance of Guideline

- 1 - exceeds CCME SQGs Agricultural
2 - exceeds CCME SQGs Residential/Parkland
3 - exceeds CCME SQGs Commercial, Industrial
4 - exceeds CEPA Disposal at Sea

Table C.5: PAH Leachate in Soil (ug/L)

Sample ID: Depth (m): Date:	NL Leachate Disposal Criteria ^a	Vardys Island - PAB Navigation Improvements Project
		VI-10
		0 - 0.43
		23-Jul-20
Leachable 1-Methylnaphthalene	-	<0.50
Leachable 2-Methylnaphthalene	-	<0.50
Leachable Acenaphthene	-	<0.10
Leachable Acenaphthylene	-	<0.10
Leachable Anthracene	-	<0.10
Leachable Benzo(a)anthracene	-	<0.10
Leachable Benzo(a)pyrene	1	<0.10
Leachable Benzo(b)fluoranthene	-	<0.10
Leachable Benzo(b/j)fluoranthene	-	<0.20
Leachable Benzo(g,h,i)perylene	-	<0.10
Leachable Benzo(j)fluoranthene	-	<0.10
Leachable Benzo(k)fluoranthene	-	<0.10
Leachable Chrysene	-	<0.10
Leachable Dibenzo(a,h)anthracene	-	<0.10
Leachable Fluoranthene	-	<0.10
Leachable Fluorene	-	<0.10
Leachable Indeno(1,2,3-cd)pyrene	-	<0.10
Leachable Naphthalene	-	<2.0
Leachable Perylene	-	<0.10
Leachable Phenanthrene	-	<0.10
Leachable Pyrene	-	<0.10

Notes:
'-' = No guideline available or parameter not analyzed
RDL = Reportable Detection Limit

a. NL Leachate Disposal Criteria = Newfoundland and Labrador Department of Environment, GD-PPD-26.1 - Leachable Toxic Waste, Testing and Disposal, 2003.

Exceedance Identification:
Shaded = Exceedance of Guideline
1 - exceeds NL Leachate Disposal Criteria

Table C.6: PCBs in Soil

Sample ID: Depth (m): Date:	Units	CCME SQGs ^a			Vardys Island - PAB Navigation Improvements Project			
					VI-10	VI-11	VI-12	VI-13
		Agricultural	Residential/ Parkland	Commercial, Industrial	0 - 0.43	0 - 0.38	0 - 0.41	0 - 0.76
					23-Jul-20	23-Jul-20	23-Jul-20	23-Jul-20
Aroclor 1016	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1221	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1232	mg/kg	-	--	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1248	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1242	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1254	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Aroclor 1260	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050
Calculated Total PCB	mg/kg	0.5	1.3	33	<0.050	<0.050	<0.050	<0.050

Notes:
'-' = No guideline available or parameter not analyzed
RDL = Reportable Detection Limit <RDL in grey text
a. CCME Soil Quality Guidelines (SQG), Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (Updated to 2018)

Exceedance Identification:

Shaded

 = Exceedance of Guideline
1 - exceeds CCME SQGs Agricultural
2 - exceeds CCME SQGs Residential/Parkland
3 - exceeds CCME SQGs Commercial, Industrial

Table C.7: Sodium Adsorption and Conductivity in Soil

Sample ID: Depth (m): Date:	Units	CCME SQGs ^a		Vardys Island - PAB Navigation Improvements Project					
				VI-02	VI-04	VI-DUP (Field Duplicate of VI-04)	VI-06	VI-07	VI-09
		Agricultural, Residential/ Parkland	Commercial, Industrial	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15
				22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Sodium Adsorption Ratio	N/A	5	12	3.0	1.5	1.6	2.6	4.9	2.9
Conductivity	µS/cm	2000	4000	240	340	270	550	82	82

Notes:
'-' = No guideline available or parameter not analyzed
RDL = Reportable Detection Limit <RDL in grey text
a. CCME Soil Quality Guidelines (SQG), Agricultural, Residential/Parkland, Commercial and Industrial Land Use, coarse grain soil (Updated to 2018)
b. The Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines (formerly the Ocean Dumping Control Act) were checked, but no guidelines exist for SAR and the listed inorganic parameters.

Exceedance Identification:
Shaded = Exceedance of Guideline
1 - exceeds CCME SQGs Agricultural, Residential/Parkland
2 - exceeds CCME SQGs Commercial, Industrial

Table C.8: Total Organic Carbon in Soil (mg/kg)

Sample ID	Vardys Island - PAB Navigation Improvements Project					
	VI-02	VI-04	VI-DUP (Field Duplicate of VI-04)	VI-06	VI-07	VI-09
	Depth (m)	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15	0 - 0.15
	Date	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19	22-Oct-19
Moisture (%)	77	71	71	80	82	82
Total Organic Carbon (TOC) (mg/kg)	500000	490000	500000	490000	510000	530000

Notes:

'-' = No guideline available or parameter not analyzed

RDL = Reportable Detection Limit

<RDL in grey text

a. The CCME Soil Quality Guidelines (SQG) were checked, but no guidelines exist for TIC and TOC.

b. The Canadian Environmental Protection Act (CEPA) Disposal at Sea Guidelines were checked, but no guidelines exist for TIC and TOC.

Table C.9: Grain Size in Soil (%)

Sample ID: Depth (m): Date:	VI-07
	0 - 0.15
	22-Oct-19
Parameters	
< -1 Phi (2 mm)	100
< 0 Phi (1 mm)	92
< +1 Phi (0.5 mm)	88
< +2 Phi (0.25 mm)	86
< +3 Phi (0.12 mm)	84
< +4 Phi (0.062 mm)	83
< +5 Phi (0.031 mm)	82
< +6 Phi (0.016 mm)	82
< +7 Phi (0.0078 mm)	79
< +8 Phi (0.0039 mm)	73
< +9 Phi (0.0020 mm)	68
Gravel	0.25
Sand	17
Silt	9.5
Clay	73

Table C.10: Soil QA/QC - Petroleum Hydrocarbons

Parameter	Units	RDL	RDL x 5	VI-04	VI-DUP	% Difference
Benzene	mg/kg	0.005	0.025	<0.050	<0.050	-
Toluene	mg/kg	0.1	0.5	<0.10	<0.10	-
Ethylbenzene	mg/kg	0.05	0.25	<0.050	<0.050	-
Xylenes	mg/kg	0.1	0.5	<0.10	<0.10	-
C6-C10 (less BTEX)	mg/kg	5	25	<5.0	<5.0	-
>C10-C16	mg/kg	10	50	<10	<10	-
>C16-C21	mg/kg	10	50	<10	<10	-
>C21-C32	mg/kg	15	75	270	230	16.0
Modified TPH	mg/kg	15	75	270	230	16.0

Notes:

1. RDL - Reported Detection Limit
2. RPD calculations are only applicable when one concentration is greater than 5 times the laboratory RDL.
3. " - " = Not calculated due to parameter(s) equal to <RDL; or <5 times RDL

Table C.11: Soil QA/QC - Metals

Parameter	Units	RDL	RDL x 5	VI-04	VI-DUP	% Difference
Aluminum (Al)	mg/kg	10	50	2800	2100	28.6
Antimony (Sb)	mg/kg	2.0	10	<2.0	2.2	-
Arsenic (As)	mg/kg	2.0	10	3.2	4.2	-
Barium (Ba)	mg/kg	5.0	25	10	12	-
Beryllium (Be)	mg/kg	2.0	10	<2.0	<2.0	-
Bismuth (Bi)	mg/kg	2.0	10	<2.0	<2.0	-
Boron (B)	mg/kg	50	250	<50	<50	-
Cadmium (Cd)	mg/kg	0.30	1.5	<0.30	0.45	-
Chromium (Cr)	mg/kg	2.0	10	6.8	6.0	-
Cobalt (Co)	mg/kg	1.0	5	<1.0	<1.0	-
Copper (Cu)	mg/kg	2.0	10	8.4	11	-
Iron (Fe)	mg/kg	50	250	3100	3700	17.6
Lead (Pb)	mg/kg	0.50	2.5	270	310	13.8
Lithium (Li)	mg/kg	2.0	10	<2.0	<2.0	-
Manganese (Mn)	mg/kg	2.0	10	16	29	57.8
Mercury (Hg)	mg/kg	0.10	0.5	0.26	0.32	-
Molybdenum (Mo)	mg/kg	2.0	10	<2.0	<2.0	-
Nickel (Ni)	mg/kg	2.0	10	3.3	4.4	-
Rubidium (Rb)	mg/kg	2.0	10	<2.0	<2.0	-
Selenium (Se)	mg/kg	1.0	5	1.9	2	-
Silver (Ag)	mg/kg	0.50	2.5	<0.50	<0.50	-
Strontium (Sr)	mg/kg	5.0	25	190	250	27.3
Thallium (Tl)	mg/kg	0.10	0.5	<0.10	<0.10	-
Tin (Sn)	mg/kg	2.0	10	<1.0	1.5	-
Uranium (U)	mg/kg	0.10	0.5	1.1	1.3	16.7
Vanadium (V)	mg/kg	2.0	10	11	11	0.0
Zinc (Zn)	mg/kg	5.0	25	33	54	48.3

Notes:

1. RDL - Reported Detection Limit
2. RPD calculations are only applicable when one concentration is greater than 5 times the laboratory RDL.
3. " - " = Not calculated due to parameter(s) equal to <RDL; or <5 times RDL

Table C.12: Soil QA/QC - Polycyclic Aromatic Hydrocarbons

Parameter	Units	RDL	RDL x 5	VI-04	VI-DUP	% Difference
1-Methylnaphthalene	mg/kg	0.010	0.05	0.037	<0.010	-
2-Methylnaphthalene	mg/kg	0.010	0.05	0.049	<0.010	-
Acenaphthene	mg/kg	0.010	0.05	0.072	<0.010	-
Acenaphthylene	mg/kg	0.010	0.05	0.95	0.091	165.0
Anthracene	mg/kg	0.010	0.05	9.9	0.37	185.6
Benzo(a)anthracene	mg/kg	0.010	0.05	33	1.9	178.2
Benzo(a)pyrene	mg/kg	0.010	0.05	25	1.4	178.8
Benzo(b)fluoranthene	mg/kg	0.010	0.05	21	1.5	173.3
Benzo(b/j)fluoranthene	mg/kg	0.020	0.1	32	2.2	174.3
Benzo(g,h,i)perylene	mg/kg	0.010	0.05	15	0.79	180.0
Benzo(j)fluoranthene	mg/kg	0.010	0.05	11	0.77	173.8
Benzo(k)fluoranthene	mg/kg	0.010	0.05	11	0.68	176.7
Chrysene	mg/kg	0.010	0.05	33	2.2	175.0
Dibenz(a,h)anthracene	mg/kg	0.010	0.05	3.4	0.19	178.8
Fluoranthene	mg/kg	0.010	0.05	75	4.8	175.9
Fluorene	mg/kg	0.010	0.05	0.18	<0.010	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.010	0.05	13	0.71	179.3
Naphthalene	mg/kg	0.010	0.05	0.13	<0.010	-
Perylene	mg/kg	0.010	0.05	6.2	0.32	180.4
Phenanthrene	mg/kg	0.010	0.05	36	1.6	183.0
Pyrene	mg/kg	0.010	0.05	67	4.1	176.9

Notes:

1. RDL - Reported Detection Limit
2. RPD calculations are only applicable when one concentration is greater than 5 times the laboratory RDL.
3. " - " = Not calculated due to parameter(s) equal to <RDL; or <5 times RDL

Table C.13: Soil QA/QC - Sodium Adsorption and Conductivity

Parameter	Units	RDL	RDL x 5	VI-04	VI-DUP	% Difference
Sodium Adsorption Ratio	N/A	N/A	N/A	1.5	1.6	6.5
Conductivity	uS/cm	1	5	340	270	23.0

- Notes:**
- 1. RDL - Reported Detection Limit
 - 2. RPD calculations are only applicable when one concentration is greater than 5 times the laboratory RDL.
 - 3. " - " = Not calculated due to parameter(s) equal to <RDL; or <5 times RDL

Table C.14: Soil QA/QC - Total Organic Carbon

Parameter	Units	RDL	RDL x 5	VI-04	VI-DUP	% Difference
Total Organic Carbon (TOC)	mg/kg	500	2500	490000	500000	2.0

Notes:

- 1. RDL - Reported Detection Limit
- 2. RPD calculations are only applicable when one concentration is greater than 5 times the laboratory RDL.
- 3. " - " = Not calculated due to parameter(s) equal to <RDL; or <5 times RDL

APPENDIX D

Laboratory Certificates of Analysis



Your Project #: 192479.45
Site#: Port Aux Basque
Site Location: MARINE ATLANTIC

Attention: Kelly MacDougall

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/04
Report #: R5951071
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9T9134

Received: 2019/10/24, 14:48

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Benzo(b/j)fluoranthene Sum (soil) (1)	6	N/A	2019/10/30	N/A	Auto Calc.
Conductance - soil (1)	6	2019/10/30	2019/11/01	ATL SOP 00004	SM 23 2510B m
TEH in Soil (PIRI) (1, 3)	2	2019/10/30	2019/10/31	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1, 3)	1	2019/10/30	2019/11/01	ATL SOP 00111	Atl. RBCA v3.1 m
Petroleum Hydrocarbons F2-F4 in Soil (2, 4)	1	2019/10/31	2019/10/31	CAM SOP-00316	CCME CWS m
Petroleum Hydrocarbons F2-F4 in Soil (2, 4)	2	2019/10/31	2019/11/01	CAM SOP-00316	CCME CWS m
SAR - ICP Metals (1:2) (1, 5)	6	N/A	2019/11/02	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS (1)	6	2019/10/30	2019/10/30	ATL SOP 00058	EPA 6020B R2 m
Moisture (1)	6	N/A	2019/10/29	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1, 3)	6	2019/10/29	2019/10/29	ATL SOP 00102	EPA 8270E R6 m
Sodium Adsorption Ratio in soil (1:2) (1, 6)	6	N/A	2019/11/04	ATL SOP 00050	Carter2e15.4.4/CCME m
Total Organic Carbon in Soil (2)	6	N/A	2019/11/01	CAM SOP-00468	BCMOE TOC Aug 2014
ModTPH (T1) Calc. for Soil (1)	3	N/A	2019/11/01	N/A	Atl. RBCA v3.1 m
Volatile Organic Compounds and F1 PHCs (2)	3	N/A	2019/10/31	CAM SOP-00230	EPA 8260 m
VPH in Soil (PIRI) - Field Preserved (1, 7)	3	N/A	2019/10/29	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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



Your Project #: 192479.45
Site#: Port Aux Basque
Site Location: MARINE ATLANTIC

Attention: Kelly MacDougall

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/04
Report #: R5951071
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9T9134

Received: 2019/10/24, 14:48

dilution methods.

Results relate to samples tested. When sampling is not conducted by BV Labs, 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) This test was performed by BV Labs Bedford
- (2) This test was performed by Bureau Veritas Laboratories Mississauga
- (3) Soils are reported on a dry weight basis unless otherwise specified.
- (4) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.
- (5) Sample filtered in laboratory prior to analysis for dissolved metals.
- (6) Sodium Adsorption Ratio is not accredited.
- (7) 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

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

Natalie MacAskill, Key Account Specialist

Email: Natalie.MacAskill@bvlabs.com

Phone# (902)567-1255 Ext:17

=====

This report has been generated and distributed using a secure automated process.

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

RBCA HYDROCARBONS IN SOIL (FIELD PRES.)

BV Labs ID		LCV850	LCV853	LCV856		
Sampling Date		2019/10/22 10:04	2019/10/22 10:29	2019/10/22 10:04		
	UNITS	VI-04	VI-07	VI-DUP	RDL	QC Batch
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.050	<0.050	<0.050	0.050	6412384
Toluene	mg/kg	<0.10	<0.10	<0.10	0.10	6412384
Ethylbenzene	mg/kg	<0.050	<0.050	<0.050	0.050	6412384
Total Xylenes	mg/kg	<0.10	<0.10	<0.10	0.10	6412384
C6 - C10 (less BTEX)	mg/kg	<5.0	<5.0	<5.0	5.0	6412384
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	10	6414323
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	10	6414323
>C21-<C32 Hydrocarbons	mg/kg	270	150	230	15	6414323
Modified TPH (Tier1)	mg/kg	270	150	230	15	6406340
Reached Baseline at C32	mg/kg	Yes	Yes	Yes	N/A	6414323
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	COMMENT (1)	COMMENT (1)	N/A	6414323
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	99	102	109		6414323
n-Dotriacontane - Extractable	%	98	105	116		6414323
Isobutylbenzene - Volatile	%	94 (2)	99 (2)	104 (2)		6412384
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Unidentified compound(s) in lube oil range. (2) Elevated VPH RDL(s) due to limited sample.						



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BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

ATL. SODIUM ADSORPTION RATIO IN S (1:2)

BV Labs ID		LCV848	LCV850	LCV852	LCV853	LCV855	LCV856		
Sampling Date		2019/10/22 09:47	2019/10/22 10:04	2019/10/22 10:20	2019/10/22 10:29	2019/10/22 10:39	2019/10/22 10:04		
	UNITS	VI-02	VI-04	VI-06	VI-07	VI-09	VI-DUP	RDL	QC Batch
Inorganics									
Sodium Adsorption Ratio	N/A	3.0	1.5	2.6	4.9	2.9	1.6	N/A	6406571
Metals									
Dissolved Calcium (Ca)	ug/L	8300	38000	15000	1400	3800	24000	100	6419373
Dissolved Magnesium (Mg)	ug/L	4800	10000	13000	1700	3500	6600	100	6419373
Dissolved Sodium (Na)	ug/L	44000	41000	57000	36000	32000	34000	100	6419373
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable									



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BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

CCME PETROLEUM HYDROCARBONS SOIL (SOIL)

BV Labs ID		LCV848		LCV852		LCV855		
Sampling Date		2019/10/22 09:47		2019/10/22 10:20		2019/10/22 10:39		
	UNITS	VI-02	RDL	VI-06	RDL	VI-09	RDL	QC Batch
Volatile Organics								
Benzene	ug/g	<0.018	0.018	<0.018	0.018	<0.024	0.024	6417630
Ethylbenzene	ug/g	<0.030	0.030	<0.030	0.030	<0.040	0.040	6417630
Toluene	ug/g	<0.060	0.060	0.073	0.060	<0.080	0.080	6417630
p+m-Xylene	ug/g	<0.060	0.060	<0.060	0.060	<0.080	0.080	6417630
o-Xylene	ug/g	<0.060	0.060	<0.060	0.060	<0.080	0.080	6417630
Total Xylenes	ug/g	<0.060	0.060	<0.060	0.060	<0.080	0.080	6417630
F1 (C6-C10)	ug/g	<60	60	<70	70	<70	70	6417630
F1 (C6-C10) - BTEX	ug/g	<60	60	<70	70	<70	70	6417630
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<40	40	<50	50	<50	50	6418073
F3 (C16-C34 Hydrocarbons)	ug/g	1000	200	910	250	790	250	6418073
F4 (C34-C50 Hydrocarbons)	ug/g	390	200	360	250	340	250	6418073
Reached Baseline at C50	ug/g	No		No		No		6418073
Surrogate Recovery (%)								
o-Terphenyl	%	101		93		106		6418073
4-Bromofluorobenzene	%	104		102		103		6417630
D10-o-Xylene	%	95		96		83		6417630
D4-1,2-Dichloroethane	%	90		91		90		6417630
D8-Toluene	%	93		92		93		6417630
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								



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BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

RESULTS OF ANALYSES OF SOIL

BV Labs ID		LCV848	LCV850	LCV852		LCV853		LCV855		
Sampling Date		2019/10/22 09:47	2019/10/22 10:04	2019/10/22 10:20		2019/10/22 10:29		2019/10/22 10:39		
	UNITS	VI-02	VI-04	VI-06	QC Batch	VI-07	QC Batch	VI-09	RDL	QC Batch
Inorganics										
Conductivity	uS/cm	240	340	550	6419744	230	6419744	320	1.0	6419744
Moisture	%	77	71	80	6412197	82	6412197	82	1.0	6412197
Total Organic Carbon	mg/kg	500000	490000	490000	6417920	510000	6419309	530000	500	6417920
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

BV Labs ID		LCV856		
Sampling Date		2019/10/22 10:04		
	UNITS	VI-DUP	RDL	QC Batch
Inorganics				
Conductivity	uS/cm	270	1.0	6419744
Moisture	%	71	1.0	6412197
Total Organic Carbon	mg/kg	500000	500	6417920
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



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BV Labs Job #: B9T9134

Report Date: 2019/11/04

CBCL Limited

Client Project #: 192479.45

Site Location: MARINE ATLANTIC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		LCV848	LCV850	LCV852	LCV853	LCV855	LCV856		
Sampling Date		2019/10/22 09:47	2019/10/22 10:04	2019/10/22 10:20	2019/10/22 10:29	2019/10/22 10:39	2019/10/22 10:04		
	UNITS	VI-02	VI-04	VI-06	VI-07	VI-09	VI-DUP	RDL	QC Batch

Metals

Acid Extractable Aluminum (Al)	mg/kg	2000	2800	1000	800	5500	2100	10	6414420
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	2.2	2.0	6414420
Acid Extractable Arsenic (As)	mg/kg	2.5	3.2	2.9	<2.0	2.4	4.2	2.0	6414420
Acid Extractable Barium (Ba)	mg/kg	36	10	92	6.8	23	12	5.0	6414420
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6414420
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6414420
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	<50	50	6414420
Acid Extractable Cadmium (Cd)	mg/kg	0.52	<0.30	0.32	<0.30	0.32	0.45	0.30	6414420
Acid Extractable Chromium (Cr)	mg/kg	3.1	6.8	3.0	<2.0	8.4	6.0	2.0	6414420
Acid Extractable Cobalt (Co)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	1.0	6414420
Acid Extractable Copper (Cu)	mg/kg	13	8.4	28	2.7	14	11	2.0	6414420
Acid Extractable Iron (Fe)	mg/kg	3200	3100	2300	1400	4500	3700	50	6414420
Acid Extractable Lead (Pb)	mg/kg	89	270	89	5.0	68	310	0.50	6414420
Acid Extractable Lithium (Li)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6414420
Acid Extractable Manganese (Mn)	mg/kg	38	16	9.5	4.9	27	29	2.0	6414420
Acid Extractable Mercury (Hg)	mg/kg	0.21	0.26	0.22	<0.10	0.17	0.32	0.10	6414420
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	2.0	6414420
Acid Extractable Nickel (Ni)	mg/kg	5.9	3.3	4.9	<2.0	6.0	4.4	2.0	6414420
Acid Extractable Rubidium (Rb)	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6414420
Acid Extractable Selenium (Se)	mg/kg	1.6	1.9	1.6	1.1	1.6	2.0	1.0	6414420
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6414420
Acid Extractable Strontium (Sr)	mg/kg	88	190	94	66	44	250	5.0	6414420
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	6414420
Acid Extractable Tin (Sn)	mg/kg	1.4	<1.0	1.3	<1.0	<1.0	1.5	1.0	6414420
Acid Extractable Uranium (U)	mg/kg	0.39	1.1	0.60	0.28	0.42	1.3	0.10	6414420
Acid Extractable Vanadium (V)	mg/kg	18	11	20	3.5	18	11	2.0	6414420
Acid Extractable Zinc (Zn)	mg/kg	42	33	32	17	44	54	5.0	6414420

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch



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BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		LCV848	LCV850	LCV852	LCV853	LCV855	LCV856		
Sampling Date		2019/10/22 09:47	2019/10/22 10:04	2019/10/22 10:20	2019/10/22 10:29	2019/10/22 10:39	2019/10/22 10:04		
	UNITS	VI-02	VI-04	VI-06	VI-07	VI-09	VI-DUP	RDL	QC Batch
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	mg/kg	<0.010	0.037	<0.010	<0.010	<0.010	<0.010	0.010	6412292
2-Methylnaphthalene	mg/kg	<0.010	0.049	<0.010	<0.010	<0.010	<0.010	0.010	6412292
Acenaphthene	mg/kg	<0.010	0.072	<0.010	<0.010	<0.010	<0.010	0.010	6412292
Acenaphthylene	mg/kg	<0.010	0.95	<0.010	<0.010	<0.010	0.091	0.010	6412292
Anthracene	mg/kg	<0.010	9.9	<0.010	<0.010	<0.010	0.37	0.010	6412292
Benzo(a)anthracene	mg/kg	<0.010	33	<0.010	<0.010	<0.010	1.9	0.010	6412292
Benzo(a)pyrene	mg/kg	<0.010	25	<0.010	<0.010	<0.010	1.4	0.010	6412292
Benzo(b)fluoranthene	mg/kg	<0.010	21	0.11	<0.010	0.083	1.5	0.010	6412292
Benzo(b,j)fluoranthene	mg/kg	<0.020	32	0.17	<0.020	0.083	2.2	0.020	6403815
Benzo(g,h,i)perylene	mg/kg	<0.010	15	<0.010	<0.010	<0.010	0.79	0.010	6412292
Benzo(j)fluoranthene	mg/kg	<0.010	11	0.052	<0.010	<0.010	0.77	0.010	6412292
Benzo(k)fluoranthene	mg/kg	<0.010	11	0.055	<0.010	0.060	0.68	0.010	6412292
Chrysene	mg/kg	<0.010	33	0.12	<0.010	0.11	2.2	0.010	6412292
Dibenz(a,h)anthracene	mg/kg	<0.010	3.4	<0.010	<0.010	<0.010	0.19	0.010	6412292
Fluoranthene	mg/kg	<0.010	75	0.13	<0.010	0.18	4.8	0.010	6412292
Fluorene	mg/kg	<0.010	0.18	<0.010	<0.010	<0.010	<0.010	0.010	6412292
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	13	<0.010	<0.010	<0.010	0.71	0.010	6412292
Naphthalene	mg/kg	<0.010	0.13	<0.010	<0.010	<0.010	<0.010	0.010	6412292
Perylene	mg/kg	<0.010	6.2	<0.010	<0.010	<0.010	0.32	0.010	6412292
Phenanthrene	mg/kg	<0.010	36	0.076	<0.010	0.094	1.6	0.010	6412292
Pyrene	mg/kg	<0.010	67	0.10	<0.010	0.13	4.1	0.010	6412292
Surrogate Recovery (%)									
D10-Anthracene	%	86	85	84	84	86	80		6412292
D14-Terphenyl (FS)	%	93	85	90	92	90	80		6412292
D8-Acenaphthylene	%	86	90	85	84	86	81		6412292
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									



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BV Labs Job #: B9T9134
Report Date: 2019/11/04

CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

GENERAL COMMENTS

TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

Sample LCV848 [VI-02] : Due to sample matrix, an extraction with a non routine ratio was done on this sample. The conductivity was done using this extract.

F2-F4 Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content and/or low weight of soil provided.

Sample LCV852 [VI-06] : F2-F4 Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content and/or low weight of soil provided.

Sample LCV855 [VI-09] : F2-F4 Analysis: Detection limits were adjusted for high moisture content.

VOCF1 Analysis: Detection limits were raised due to high moisture content and/or low weight of soil provided.

Results relate only to the items tested.

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VERITASBV Labs Job #: B9T9134
Report Date: 2019/11/04CBCL Limited
Client Project #: 192479.45
Site Location: MARINE ATLANTIC

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6412197	YLG	RPD	Moisture	2019/10/29	2.6		%	25
6412292	LGE	Matrix Spike	D10-Anthracene	2019/10/29		99	%	50 - 130
			D14-Terphenyl (FS)	2019/10/29		97	%	50 - 130
			D8-Acenaphthylene	2019/10/29		94	%	50 - 130
			1-Methylnaphthalene	2019/10/29		109	%	50 - 130
			2-Methylnaphthalene	2019/10/29		104	%	50 - 130
			Acenaphthene	2019/10/29		109	%	50 - 130
			Acenaphthylene	2019/10/29		105	%	50 - 130
			Anthracene	2019/10/29		102	%	50 - 130
			Benzo(a)anthracene	2019/10/29		119	%	50 - 130
			Benzo(a)pyrene	2019/10/29		100	%	50 - 130
			Benzo(b)fluoranthene	2019/10/29		106	%	50 - 130
			Benzo(g,h,i)perylene	2019/10/29		101	%	50 - 130
			Benzo(j)fluoranthene	2019/10/29		109	%	50 - 130
			Benzo(k)fluoranthene	2019/10/29		108	%	50 - 130
			Chrysene	2019/10/29		121	%	50 - 130
			Dibenz(a,h)anthracene	2019/10/29		96	%	50 - 130
			Fluoranthene	2019/10/29		111	%	50 - 130
			Fluorene	2019/10/29		106	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/10/29		98	%	50 - 130
			Naphthalene	2019/10/29		110	%	50 - 130
			Perylene	2019/10/29		107	%	50 - 130
			Phenanthrene	2019/10/29		114	%	50 - 130
			Pyrene	2019/10/29		113	%	50 - 130
6412292	LGE	Spiked Blank	D10-Anthracene	2019/10/29		95	%	50 - 130
			D14-Terphenyl (FS)	2019/10/29		94	%	50 - 130
			D8-Acenaphthylene	2019/10/29		93	%	50 - 130
			1-Methylnaphthalene	2019/10/29		107	%	50 - 130
			2-Methylnaphthalene	2019/10/29		102	%	50 - 130
			Acenaphthene	2019/10/29		106	%	50 - 130
			Acenaphthylene	2019/10/29		102	%	50 - 130
			Anthracene	2019/10/29		97	%	50 - 130
			Benzo(a)anthracene	2019/10/29		113	%	50 - 130
			Benzo(a)pyrene	2019/10/29		94	%	50 - 130
			Benzo(b)fluoranthene	2019/10/29		101	%	50 - 130
			Benzo(g,h,i)perylene	2019/10/29		94	%	50 - 130
			Benzo(j)fluoranthene	2019/10/29		104	%	50 - 130
			Benzo(k)fluoranthene	2019/10/29		107	%	50 - 130
			Chrysene	2019/10/29		116	%	50 - 130
			Dibenz(a,h)anthracene	2019/10/29		88	%	50 - 130
			Fluoranthene	2019/10/29		107	%	50 - 130
			Fluorene	2019/10/29		103	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/10/29		91	%	50 - 130
			Naphthalene	2019/10/29		108	%	50 - 130
			Perylene	2019/10/29		101	%	50 - 130
			Phenanthrene	2019/10/29		112	%	50 - 130
			Pyrene	2019/10/29		109	%	50 - 130
6412292	LGE	Method Blank	D10-Anthracene	2019/10/29		103	%	50 - 130
			D14-Terphenyl (FS)	2019/10/29		100	%	50 - 130
			D8-Acenaphthylene	2019/10/29		95	%	50 - 130
			1-Methylnaphthalene	2019/10/29	<0.010		mg/kg	
			2-Methylnaphthalene	2019/10/29	<0.010		mg/kg	
			Acenaphthene	2019/10/29	<0.010		mg/kg	
			Acenaphthylene	2019/10/29	<0.010		mg/kg	

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6412292	LGE	RPD	Anthracene	2019/10/29	<0.010		mg/kg	
			Benzo(a)anthracene	2019/10/29	<0.010		mg/kg	
			Benzo(a)pyrene	2019/10/29	<0.010		mg/kg	
			Benzo(b)fluoranthene	2019/10/29	<0.010		mg/kg	
			Benzo(g,h,i)perylene	2019/10/29	<0.010		mg/kg	
			Benzo(j)fluoranthene	2019/10/29	<0.010		mg/kg	
			Benzo(k)fluoranthene	2019/10/29	<0.010		mg/kg	
			Chrysene	2019/10/29	<0.010		mg/kg	
			Dibenz(a,h)anthracene	2019/10/29	<0.010		mg/kg	
			Fluoranthene	2019/10/29	<0.010		mg/kg	
			Fluorene	2019/10/29	<0.010		mg/kg	
			Indeno(1,2,3-cd)pyrene	2019/10/29	<0.010		mg/kg	
			Naphthalene	2019/10/29	<0.010		mg/kg	
			Perylene	2019/10/29	<0.010		mg/kg	
			Phenanthrene	2019/10/29	<0.010		mg/kg	
			Pyrene	2019/10/29	<0.010		mg/kg	
			1-Methylnaphthalene	2019/10/29	NC		%	50
			2-Methylnaphthalene	2019/10/29	NC		%	50
			Acenaphthene	2019/10/29	NC		%	50
			Acenaphthylene	2019/10/29	NC		%	50
6412384	SHL	Matrix Spike	Anthracene	2019/10/29	NC		%	50
			Benzo(a)anthracene	2019/10/29	NC		%	50
			Benzo(a)pyrene	2019/10/29	NC		%	50
			Benzo(b)fluoranthene	2019/10/29	NC		%	50
			Benzo(g,h,i)perylene	2019/10/29	NC		%	50
			Benzo(j)fluoranthene	2019/10/29	NC		%	50
			Benzo(k)fluoranthene	2019/10/29	NC		%	50
			Chrysene	2019/10/29	NC		%	50
			Dibenz(a,h)anthracene	2019/10/29	NC		%	50
			Fluoranthene	2019/10/29	NC		%	50
6412384	SHL	Spiked Blank	Fluorene	2019/10/29	NC		%	50
			Indeno(1,2,3-cd)pyrene	2019/10/29	NC		%	50
			Naphthalene	2019/10/29	NC		%	50
			Perylene	2019/10/29	NC		%	50
			Phenanthrene	2019/10/29	NC		%	50
6412384	SHL	Method Blank	Pyrene	2019/10/29	NC		%	50
			Isobutylbenzene - Volatile	2019/10/29		103	%	60 - 130
			Benzene	2019/10/29		96	%	60 - 130
			Toluene	2019/10/29		94	%	60 - 130
			Ethylbenzene	2019/10/29		97	%	60 - 130
6412384	SHL	Spiked Blank	Total Xylenes	2019/10/29		92	%	60 - 130
			Isobutylbenzene - Volatile	2019/10/29		99	%	60 - 130
			Benzene	2019/10/29		102	%	60 - 140
			Toluene	2019/10/29		103	%	60 - 140
			Ethylbenzene	2019/10/29		102	%	60 - 140
6412384	SHL	Method Blank	Total Xylenes	2019/10/29		100	%	60 - 140
			Isobutylbenzene - Volatile	2019/10/29		104	%	60 - 130
			Benzene	2019/10/29	<0.025		mg/kg	
			Toluene	2019/10/29	<0.050		mg/kg	
			Ethylbenzene	2019/10/29	<0.025		mg/kg	
6412384	SHL	RPD	Total Xylenes	2019/10/29	<0.050		mg/kg	
			C6 - C10 (less BTEX)	2019/10/29	<2.5		mg/kg	
			Benzene	2019/10/29	NC		%	50
			Toluene	2019/10/29	NC		%	50

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6414323	DBF	Matrix Spike	Ethylbenzene	2019/10/29	NC		%	50
			Total Xylenes	2019/10/29	NC		%	50
			C6 - C10 (less BTEX)	2019/10/29	NC		%	50
			Isobutylbenzene - Extractable	2019/10/30		101	%	60 - 130
			n-Dotriacontane - Extractable	2019/10/30		91	%	60 - 130
			>C10-C16 Hydrocarbons	2019/10/30		NC	%	30 - 130
			>C16-C21 Hydrocarbons	2019/10/30		102	%	30 - 130
6414323	DBF	Spiked Blank	>C21-<C32 Hydrocarbons	2019/10/30		120	%	30 - 130
			Isobutylbenzene - Extractable	2019/10/30		97	%	60 - 130
			n-Dotriacontane - Extractable	2019/10/30		87	%	60 - 130
			>C10-C16 Hydrocarbons	2019/10/30		106	%	60 - 130
			>C16-C21 Hydrocarbons	2019/10/30		93	%	60 - 130
6414323	DBF	Method Blank	>C21-<C32 Hydrocarbons	2019/10/30		112	%	60 - 130
			Isobutylbenzene - Extractable	2019/10/30		96	%	60 - 130
			n-Dotriacontane - Extractable	2019/10/30		88	%	60 - 130
			>C10-C16 Hydrocarbons	2019/10/30	<10		mg/kg	
			>C16-C21 Hydrocarbons	2019/10/30	<10		mg/kg	
6414323	DBF	RPD	>C21-<C32 Hydrocarbons	2019/10/30	<15		mg/kg	
			>C10-C16 Hydrocarbons	2019/10/31	36		%	50
			>C16-C21 Hydrocarbons	2019/10/31	28		%	50
			>C21-<C32 Hydrocarbons	2019/10/31	29		%	50
6414420	MLB	Matrix Spike	Acid Extractable Antimony (Sb)	2019/10/31		NC	%	75 - 125
			Acid Extractable Arsenic (As)	2019/10/31		104	%	75 - 125
			Acid Extractable Barium (Ba)	2019/10/31		NC	%	75 - 125
			Acid Extractable Beryllium (Be)	2019/10/31		104	%	75 - 125
			Acid Extractable Bismuth (Bi)	2019/10/31		108	%	75 - 125
			Acid Extractable Boron (B)	2019/10/31		99	%	75 - 125
			Acid Extractable Cadmium (Cd)	2019/10/31		104	%	75 - 125
			Acid Extractable Chromium (Cr)	2019/10/31		103	%	75 - 125
			Acid Extractable Cobalt (Co)	2019/10/31		110	%	75 - 125
			Acid Extractable Copper (Cu)	2019/10/31		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2019/10/31		NC	%	75 - 125
			Acid Extractable Lithium (Li)	2019/10/31		114	%	75 - 125
			Acid Extractable Manganese (Mn)	2019/10/31		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2019/10/31		102	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2019/10/31		112	%	75 - 125
			Acid Extractable Nickel (Ni)	2019/10/31		108	%	75 - 125
			Acid Extractable Rubidium (Rb)	2019/10/31		107	%	75 - 125
			Acid Extractable Selenium (Se)	2019/10/31		105	%	75 - 125
			Acid Extractable Silver (Ag)	2019/10/31		105	%	75 - 125
			Acid Extractable Strontium (Sr)	2019/10/31		121	%	75 - 125
			Acid Extractable Thallium (Tl)	2019/10/31		106	%	75 - 125
			Acid Extractable Tin (Sn)	2019/10/31		NC	%	75 - 125
			Acid Extractable Uranium (U)	2019/10/31		110	%	75 - 125
			Acid Extractable Vanadium (V)	2019/10/31		106	%	75 - 125
			Acid Extractable Zinc (Zn)	2019/10/31		NC	%	75 - 125
	MLB	Spiked Blank	Acid Extractable Antimony (Sb)	2019/10/30		101	%	75 - 125
			Acid Extractable Arsenic (As)	2019/10/30		102	%	75 - 125
			Acid Extractable Barium (Ba)	2019/10/30		101	%	75 - 125
			Acid Extractable Beryllium (Be)	2019/10/30		95	%	75 - 125
			Acid Extractable Bismuth (Bi)	2019/10/30		103	%	75 - 125
			Acid Extractable Boron (B)	2019/10/30		96	%	75 - 125
			Acid Extractable Cadmium (Cd)	2019/10/30		98	%	75 - 125
			Acid Extractable Chromium (Cr)	2019/10/30		98	%	75 - 125

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6414420	MLB	Method Blank	Acid Extractable Cobalt (Co)	2019/10/30		101	%	75 - 125
			Acid Extractable Copper (Cu)	2019/10/30		99	%	75 - 125
			Acid Extractable Lead (Pb)	2019/10/30		103	%	75 - 125
			Acid Extractable Lithium (Li)	2019/10/30		101	%	75 - 125
			Acid Extractable Manganese (Mn)	2019/10/30		102	%	75 - 125
			Acid Extractable Mercury (Hg)	2019/10/30		104	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2019/10/30		105	%	75 - 125
			Acid Extractable Nickel (Ni)	2019/10/30		101	%	75 - 125
			Acid Extractable Rubidium (Rb)	2019/10/30		101	%	75 - 125
			Acid Extractable Selenium (Se)	2019/10/30		104	%	75 - 125
			Acid Extractable Silver (Ag)	2019/10/30		102	%	75 - 125
			Acid Extractable Strontium (Sr)	2019/10/30		104	%	75 - 125
			Acid Extractable Thallium (Tl)	2019/10/30		104	%	75 - 125
			Acid Extractable Tin (Sn)	2019/10/30		105	%	75 - 125
			Acid Extractable Uranium (U)	2019/10/30		104	%	75 - 125
			Acid Extractable Vanadium (V)	2019/10/30		98	%	75 - 125
			Acid Extractable Zinc (Zn)	2019/10/30		100	%	75 - 125
			Acid Extractable Aluminum (Al)	2019/10/30	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2019/10/30	<5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Boron (B)	2019/10/30	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2019/10/30	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2019/10/30	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2019/10/30	<50		mg/kg	
			Acid Extractable Lead (Pb)	2019/10/30	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2019/10/30	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2019/10/30	<1.0		mg/kg	
			Acid Extractable Silver (Ag)	2019/10/30	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2019/10/30	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2019/10/30	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2019/10/30	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2019/10/30	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2019/10/30	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2019/10/30	<5.0		mg/kg	
6414420	MLB	RPD	Acid Extractable Lead (Pb)	2019/10/31	28		%	35
6417630	AYA	Matrix Spike	4-Bromofluorobenzene	2019/10/31		110	%	60 - 140
			D10-o-Xylene	2019/10/31		129	%	60 - 130
			D4-1,2-Dichloroethane	2019/10/31		91	%	60 - 140
			D8-Toluene	2019/10/31		97	%	60 - 140
			Benzene	2019/10/31		88	%	60 - 140
			Ethylbenzene	2019/10/31		115	%	60 - 140
			Toluene	2019/10/31		90	%	60 - 140
			p+m-Xylene	2019/10/31		86	%	60 - 140
			o-Xylene	2019/10/31		106	%	60 - 140



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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6417630	AYA	Spiked Blank	F1 (C6-C10)	2019/10/31		NC	%	60 - 140
			4-Bromofluorobenzene	2019/10/31		109	%	60 - 140
			D10-o-Xylene	2019/10/31		116	%	60 - 130
			D4-1,2-Dichloroethane	2019/10/31		92	%	60 - 140
			D8-Toluene	2019/10/31		101	%	60 - 140
			Benzene	2019/10/31		91	%	60 - 130
			Ethylbenzene	2019/10/31		99	%	60 - 130
			Toluene	2019/10/31		90	%	60 - 130
			p+m-Xylene	2019/10/31		78	%	60 - 130
			o-Xylene	2019/10/31		101	%	60 - 130
6417630	AYA	Method Blank	F1 (C6-C10)	2019/10/31		92	%	80 - 120
			4-Bromofluorobenzene	2019/10/31		102	%	60 - 140
			D10-o-Xylene	2019/10/31		98	%	60 - 130
			D4-1,2-Dichloroethane	2019/10/31		94	%	60 - 140
			D8-Toluene	2019/10/31		93	%	60 - 140
			Benzene	2019/10/31	<0.0060		ug/g	
			Ethylbenzene	2019/10/31	<0.010		ug/g	
			Toluene	2019/10/31	<0.020		ug/g	
			p+m-Xylene	2019/10/31	<0.020		ug/g	
			o-Xylene	2019/10/31	<0.020		ug/g	
6417630	AYA	RPD	Total Xylenes	2019/10/31	<0.020		ug/g	
			F1 (C6-C10)	2019/10/31	<10		ug/g	
			F1 (C6-C10) - BTEX	2019/10/31	<10		ug/g	
			Benzene	2019/10/31	NC		%	50
			Ethylbenzene	2019/10/31	1.5		%	50
			Toluene	2019/10/31	NC		%	50
			p+m-Xylene	2019/10/31	6.2		%	50
			o-Xylene	2019/10/31	6.3		%	50
			Total Xylenes	2019/10/31	6.2		%	50
			F1 (C6-C10)	2019/10/31	18		%	30
6417920	DM1	QC Standard	F1 (C6-C10) - BTEX	2019/10/31	18		%	30
			Total Organic Carbon	2019/11/01		100	%	75 - 125
			Total Organic Carbon	2019/11/01	<500		mg/kg	
			Total Organic Carbon	2019/11/01	NC		%	35
			o-Terphenyl	2019/10/31		108	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/10/31		110	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2019/10/31		99	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2019/10/31		106	%	50 - 130
			o-Terphenyl	2019/10/31		106	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/10/31		109	%	80 - 120
6418073	GUL	Spiked Blank	F3 (C16-C34 Hydrocarbons)	2019/10/31		99	%	80 - 120
			F4 (C34-C50 Hydrocarbons)	2019/10/31		104	%	80 - 120
			o-Terphenyl	2019/10/31		99	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2019/10/31	<10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2019/10/31	<50		ug/g	
			F4 (C34-C50 Hydrocarbons)	2019/10/31	<50		ug/g	
			F2 (C10-C16 Hydrocarbons)	2019/11/01	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2019/11/01	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2019/11/01	NC		%	30
			Total Organic Carbon	2019/11/01		102	%	75 - 125
6419309	DM1	Method Blank	Total Organic Carbon	2019/11/01	<500		mg/kg	
			Total Organic Carbon	2019/11/01	4.6		%	35
			Total Organic Carbon	2019/11/01			%	30
			F2 (C10-C16 Hydrocarbons)	2019/11/01	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2019/11/01	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2019/11/01	NC		%	30
			Total Organic Carbon	2019/11/01		102	%	75 - 125
			Total Organic Carbon	2019/11/01	<500		mg/kg	
			Total Organic Carbon	2019/11/01	4.6		%	35
			Total Organic Carbon	2019/11/01			%	30
6419373	BAN	Matrix Spike [LCV850-01]	Dissolved Calcium (Ca)	2019/11/02		NC	%	80 - 120
			Dissolved Magnesium (Mg)	2019/11/02		NC	%	80 - 120



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6419373	BAN	Spiked Blank	Dissolved Sodium (Na)	2019/11/02		NC	%	80 - 120
			Dissolved Calcium (Ca)	2019/11/02		97	%	80 - 120
			Dissolved Magnesium (Mg)	2019/11/02		96	%	80 - 120
6419373	BAN	Method Blank	Dissolved Sodium (Na)	2019/11/02		94	%	80 - 120
			Dissolved Calcium (Ca)	2019/11/02	<100		ug/L	
			Dissolved Magnesium (Mg)	2019/11/02	<100		ug/L	
6419744	SSI	RPD	Dissolved Sodium (Na)	2019/11/02	<100		ug/L	
			Conductivity	2019/11/01	11		%	20

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

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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

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

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

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the 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 $\leq 2 \times \text{RDL}$).



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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

Ewa Pranjić, M.Sc., C.Chem, Scientific Specialist

Phil Deveau, Scientific Specialist (Organics)

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Your Project #: 192479.45
Site#: Port Aux Basque
Site Location: MARINE ATLANTIC

Attention: Kelly MacDougall

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/22
Report #: R5976030
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0122

Received: 2019/10/24, 13:06

Sample Matrix: Soil
Samples Received: 1

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Particle size in solids (pipette&sieve) (1, 2)	1	N/A	2019/11/22	ATL SOP 00012	MSAMS'78/WREP-125R3m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

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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. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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

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

(1) This test was performed by BV Labs Bedford

(2) Note: Graphical representation of larger fractions (PHI-4, PHI -3 and PHI -2) not applicable unless these optional parameters are specifically requested.



Your Project #: 192479.45
Site#: Port Aux Basque
Site Location: MARINE ATLANTIC

Attention: Kelly MacDougall

CBCL Limited
Halifax - Standing offer
1505 Barrington Street
Suite 901 / PO Box 606
Halifax, NS
CANADA B3J 3Y6

Report Date: 2019/11/22
Report #: R5976030
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9U0122

Received: 2019/10/24, 13:06

Encryption Key

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

Natalie MacAskill, Key Account Specialist

Email: Natalie.MacAskill@bvlabs.com

Phone# (902)567-1255 Ext:17

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BV Labs Job #: B9U0122

Report Date: 2019/11/22

CBCL Limited

Client Project #: 192479.45

Site Location: MARINE ATLANTIC

RESULTS OF ANALYSES OF SOIL

BV Labs ID		LDA911		
Sampling Date		2019/10/22 10:29		
	UNITS	VI-07	RDL	QC Batch
Inorganics				
< -1 Phi (2 mm)	%	100	0.10	6447624
< 0 Phi (1 mm)	%	92	0.10	6447624
< +1 Phi (0.5 mm)	%	88	0.10	6447624
< +2 Phi (0.25 mm)	%	86	0.10	6447624
< +3 Phi (0.12 mm)	%	84	0.10	6447624
< +4 Phi (0.062 mm)	%	83	0.10	6447624
< +5 Phi (0.031 mm)	%	82	0.10	6447624
< +6 Phi (0.016 mm)	%	82	0.10	6447624
< +7 Phi (0.0078 mm)	%	79	0.10	6447624
< +8 Phi (0.0039 mm)	%	73	0.10	6447624
< +9 Phi (0.0020 mm)	%	68	0.10	6447624
Gravel	%	0.25	0.10	6447624
Sand	%	17	0.10	6447624
Silt	%	9.5	0.10	6447624
Clay	%	73	0.10	6447624
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				



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BV Labs Job #: B9U0122

Report Date: 2019/11/22

CBCL Limited

Client Project #: 192479.45

Site Location: MARINE ATLANTIC

GENERAL COMMENTS

Results relate only to the items tested.



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BV Labs Job #: B9U0122

Report Date: 2019/11/22

CBCL Limited

Client Project #: 192479.45

Site Location: MARINE ATLANTIC

QUALITY ASSURANCE REPORT

QA/QC		QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
Batch	Init							
6447624	MLW	RPD	Gravel	2019/11/21	NC		%	35
			Sand	2019/11/21	0.11		%	35
			Silt	2019/11/21	2.4		%	35
			Clay	2019/11/21	12		%	35
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.								
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).								



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BV Labs Job #: B9U0122

Report Date: 2019/11/22

CBCL Limited

Client Project #: 192479.45

Site Location: MARINE ATLANTIC

VALIDATION SIGNATURE PAGE

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

A handwritten signature in black ink, appearing to be 'Gina Thompson', followed by a horizontal line.

Gina Thompson, Inorganics General Chemistry Supervisor

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Your Project #: 202479.05
Site Location: VARDYS ISLAND

Attention: Lorna Campbell

CBCL Limited
Sydney-Standing Offer
164 Charlotte St
Sydney, NS
CANADA B1P 6J7

Report Date: 2020/08/12
Report #: R6289529
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0I8518

Received: 2020/07/27, 09:00

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Benzo(b/j)fluoranthene Sum (leachates) (1)	1	N/A	2020/08/10	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (soil) (1)	3	N/A	2020/08/04	N/A	Auto Calc.
TEH in Soil (PIRI) (1, 2)	1	2020/07/30	2020/07/31	ATL SOP 00111	Atl. RBCA v3.1 m
TEH in Soil (PIRI) (1, 2)	2	2020/07/31	2020/07/31	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Leach TCLP/CGSB extraction (1)	1	2020/08/05	2020/08/07	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS (1)	3	2020/07/31	2020/08/01	ATL SOP 00058	EPA 6020B R2 m
Moisture (1)	4	N/A	2020/07/31	ATL SOP 00001	OMOE Handbook 1983 m
PAH in Leachate by GC/MS (SIM) (1)	1	2020/08/07	2020/08/08	ATL SOP 00103	EPA 8270E R6 m
PAH Compounds by GCMS (SIM) (1, 2)	3	2020/07/31	2020/07/31	ATL SOP 00102	EPA 8270E R6 m
PCBs in soil by GC/ECD (1, 2)	4	2020/07/30	2020/07/31	ATL SOP 00106	EPA 8082A 2007 m
PCB Aroclor sum (soil) (1)	4	N/A	2020/07/31	N/A	Auto Calc.
TCLP Inorganic extraction - pH (1)	1	N/A	2020/08/05	ATL SOP 00035	EPA 1311 m
TCLP Inorganic extraction - Weight (1)	1	N/A	2020/08/05	ATL SOP 00035	EPA 1311 m
ModTPH (T1) Calc. for Soil (1)	3	N/A	2020/08/04	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (1, 3)	3	N/A	2020/07/30	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

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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.



Your Project #: 202479.05
Site Location: VARDYS ISLAND

Attention: Lorna Campbell

CBCL Limited
Sydney-Standing Offer
164 Charlotte St
Sydney, NS
CANADA B1P 6J7

Report Date: 2020/08/12
Report #: R6289529
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0I8518

Received: 2020/07/27, 09:00

Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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

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

(1) This test was performed by BV Labs Bedford

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

(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

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

Natalie MacAskill, Key Account Specialist

Email: Natalie.MacAskill@bvlab.com

Phone# (902)567-1255 Ext:17

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BV Labs Job #: C0I8518
Report Date: 2020/08/12

CBCL Limited
Client Project #: 202479.05
Site Location: VARDYS ISLAND

RBCA HYDROCARBONS IN SOIL (FIELD PRES.)

BV Labs ID		NFD882			NFE001		NFE002		
Sampling Date		2020/07/23 11:15			2020/07/23 11:30		2020/07/23 12:00		
	UNITS	VI-11	RDL	QC Batch	VI-12	RDL	VI-13	RDL	QC Batch
Inorganics									
Moisture	%	79	1.0	6863505	66	1.0	78	1.0	6863857
Petroleum Hydrocarbons									
Benzene	mg/kg	<0.050	0.050	6863560	<0.025	0.025	<0.050	0.050	6863560
Toluene	mg/kg	<0.10	0.10	6863560	<0.050	0.050	<0.10	0.10	6863560
Ethylbenzene	mg/kg	<0.050	0.050	6863560	<0.025	0.025	<0.050	0.050	6863560
Total Xylenes	mg/kg	<0.10	0.10	6863560	<0.050	0.050	<0.10	0.10	6863560
C6 - C10 (less BTEX)	mg/kg	<5.0	5.0	6863560	<2.5	2.5	<5.0	5.0	6863560
>C10-C16 Hydrocarbons	mg/kg	<10	10	6865678	<10	10	<10	10	6865678
>C16-C21 Hydrocarbons	mg/kg	<10	10	6865678	<10	10	<10	10	6865678
>C21-<C32 Hydrocarbons	mg/kg	150	15	6865678	180	15	220	15	6865678
Modified TPH (Tier1)	mg/kg	150	15	6856594	180	15	220	15	6856594
Reached Baseline at C32	mg/kg	Yes	N/A	6865678	Yes	N/A	Yes	N/A	6865678
Hydrocarbon Resemblance	mg/kg	COMMENT (1)	N/A	6865678	COMMENT (1)	N/A	COMMENT (1)	N/A	6865678
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	93		6865678	89		92		6865678
n-Dotriacontane - Extractable	%	101		6865678	101		111		6865678
Isobutylbenzene - Volatile	%	101 (2)		6863560	99		103 (2)		6863560
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Unidentified compound(s) in lube oil range. (2) Elevated VPH RDL(s) due to limited sample.									



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BV Labs Job #: C0I8518
Report Date: 2020/08/12

CBCL Limited
Client Project #: 202479.05
Site Location: VARDYS ISLAND

ATLANTIC TCLP LEACHATE + METALS (SOIL)

BV Labs ID		NFD881		
Sampling Date		2020/07/23 11:00		
	UNITS	VI-10	RDL	QC Batch
Inorganics				
Sample Weight (as received)	g	100	N/A	6869312
Initial pH	N/A	5.0		6869320
Final pH	N/A	5.0		6869320
Metals				
Leachable Aluminum (Al)	ug/L	1500	100	6871621
Leachable Antimony (Sb)	ug/L	<20	20	6871621
Leachable Arsenic (As)	ug/L	<20	20	6871621
Leachable Barium (Ba)	ug/L	66	50	6871621
Leachable Beryllium (Be)	ug/L	<20	20	6871621
Leachable Boron (B)	ug/L	<500	500	6871621
Leachable Cadmium (Cd)	ug/L	<3.0	3.0	6871621
Leachable Calcium (Ca)	ug/L	8800	1000	6871621
Leachable Chromium (Cr)	ug/L	<20	20	6871621
Leachable Cobalt (Co)	ug/L	<10	10	6871621
Leachable Copper (Cu)	ug/L	<20	20	6871621
Leachable Iron (Fe)	ug/L	530	500	6871621
Leachable Lead (Pb)	ug/L	6.9	5.0	6871621
Leachable Lithium (Li)	ug/L	<20	20	6871621
Leachable Magnesium (Mg)	ug/L	4300	1000	6871621
Leachable Manganese (Mn)	ug/L	<20	20	6871621
Leachable Molybdenum (Mo)	ug/L	<20	20	6871621
Leachable Nickel (Ni)	ug/L	<20	20	6871621
Leachable Potassium (K)	ug/L	1700	1000	6871621
Leachable Selenium (Se)	ug/L	<10	10	6871621
Leachable Silver (Ag)	ug/L	<5.0	5.0	6871621
Leachable Strontium (Sr)	ug/L	96	50	6871621
Leachable Thallium (Tl)	ug/L	<1.0	1.0	6871621
Leachable Tin (Sn)	ug/L	<20	20	6871621
Leachable Uranium (U)	ug/L	<1.0	1.0	6871621
Leachable Vanadium (V)	ug/L	<20	20	6871621
Leachable Zinc (Zn)	ug/L	65	50	6871621
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable				



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BV Labs Job #: C0I8518

Report Date: 2020/08/12

CBCL Limited

Client Project #: 202479.05

Site Location: VARDYS ISLAND

RESULTS OF ANALYSES OF SOIL

BV Labs ID		NFD881		
Sampling Date		2020/07/23 11:00		
	UNITS	VI-10	RDL	QC Batch
Inorganics				
Moisture	%	41	1.0	6863505
RDL = Reportable Detection Limit				
QC Batch = Quality Control Batch				

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BV Labs Job #: C0I8518

Report Date: 2020/08/12

CBCL Limited

Client Project #: 202479.05

Site Location: VARDYS ISLAND

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

BV Labs ID		NFD882	NFE001	NFE002		
Sampling Date		2020/07/23 11:15	2020/07/23 11:30	2020/07/23 12:00		
	UNITS	VI-11	VI-12	VI-13	RDL	QC Batch
Metals						
Acid Extractable Aluminum (Al)	mg/kg	3100	3700	3000	10	6865720
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Arsenic (As)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Barium (Ba)	mg/kg	8.4	9.5	8.8	5.0	6865720
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	50	6865720
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	0.37	0.30	6865720
Acid Extractable Chromium (Cr)	mg/kg	4.1	8.6	2.3	2.0	6865720
Acid Extractable Cobalt (Co)	mg/kg	<1.0	<1.0	<1.0	1.0	6865720
Acid Extractable Copper (Cu)	mg/kg	8.9	4.7	2.8	2.0	6865720
Acid Extractable Iron (Fe)	mg/kg	2700	1300	1000	50	6865720
Acid Extractable Lead (Pb)	mg/kg	37	8.0	11	0.50	6865720
Acid Extractable Lithium (Li)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Manganese (Mn)	mg/kg	9.3	19	8.8	2.0	6865720
Acid Extractable Mercury (Hg)	mg/kg	0.19	0.12	0.13	0.10	6865720
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Nickel (Ni)	mg/kg	3.0	<2.0	<2.0	2.0	6865720
Acid Extractable Rubidium (Rb)	mg/kg	<2.0	<2.0	<2.0	2.0	6865720
Acid Extractable Selenium (Se)	mg/kg	1.6	<0.50	1.3	0.50	6865720
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	0.50	6865720
Acid Extractable Strontium (Sr)	mg/kg	66	12	94	5.0	6865720
Acid Extractable Thallium (Tl)	mg/kg	<0.10	<0.10	<0.10	0.10	6865720
Acid Extractable Tin (Sn)	mg/kg	<1.0	<1.0	<1.0	1.0	6865720
Acid Extractable Uranium (U)	mg/kg	0.46	0.49	0.18	0.10	6865720
Acid Extractable Vanadium (V)	mg/kg	12	18	4.3	2.0	6865720
Acid Extractable Zinc (Zn)	mg/kg	26	10	16	5.0	6865720
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						



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BV Labs Job #: C0I8518
Report Date: 2020/08/12

CBCL Limited
Client Project #: 202479.05
Site Location: VARDYS ISLAND

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		NFD881			NFD882		NFE001		NFE002		
Sampling Date		2020/07/23 11:00			2020/07/23 11:15		2020/07/23 11:30		2020/07/23 12:00		
	UNITS	VI-10	RDL	QC Batch	VI-11	RDL	VI-12	RDL	VI-13	RDL	QC Batch
Polyaromatic Hydrocarbons											
Leachable 1-Methylnaphthalene	ug/L	<0.50	0.50	6876292							
Leachable 2-Methylnaphthalene	ug/L	<0.50	0.50	6876292							
Leachable Acenaphthene	ug/L	<0.10	0.10	6876292							
Leachable Acenaphthylene	ug/L	<0.10	0.10	6876292							
Leachable Anthracene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(a)anthracene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(a)pyrene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(b)fluoranthene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(b,j)fluoranthene	ug/L	<0.20	0.20	6859382							
Leachable Benzo(g,h,i)perylene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(j)fluoranthene	ug/L	<0.10	0.10	6876292							
Leachable Benzo(k)fluoranthene	ug/L	<0.10	0.10	6876292							
Leachable Chrysene	ug/L	<0.10	0.10	6876292							
Leachable Dibenzo(a,h)anthracene	ug/L	<0.10	0.10	6876292							
Leachable Fluoranthene	ug/L	<0.10	0.10	6876292							
Leachable Fluorene	ug/L	<0.10	0.10	6876292							
Leachable Indeno(1,2,3-cd)pyrene	ug/L	<0.10	0.10	6876292							
Leachable Naphthalene	ug/L	<2.0	2.0	6876292							
Leachable Perylene	ug/L	<0.10	0.10	6876292							
Leachable Phenanthrene	ug/L	<0.10	0.10	6876292							
Leachable Pyrene	ug/L	<0.10	0.10	6876292							
1-Methylnaphthalene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
2-Methylnaphthalene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Acenaphthene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Acenaphthylene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Anthracene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(a)anthracene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(a)pyrene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(b)fluoranthene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(b,j)fluoranthene	mg/kg				<0.020	0.020	<0.020	0.020	<0.020	0.020	6858698
Benzo(g,h,i)perylene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(j)fluoranthene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Benzo(k)fluoranthene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Chrysene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Dibenzo(a,h)anthracene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
RDL = Reportable Detection Limit											
QC Batch = Quality Control Batch											



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BV Labs Job #: C018518
Report Date: 2020/08/12

CBCL Limited
Client Project #: 202479.05
Site Location: VARDYS ISLAND

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

BV Labs ID		NFD881			NFD882		NFE001		NFE002		
Sampling Date		2020/07/23 11:00			2020/07/23 11:15		2020/07/23 11:30		2020/07/23 12:00		
	UNITS	VI-10	RDL	QC Batch	VI-11	RDL	VI-12	RDL	VI-13	RDL	QC Batch
Fluoranthene	mg/kg				0.049	0.010	0.043	0.010	<0.010	0.010	6865544
Fluorene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Indeno(1,2,3-cd)pyrene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Naphthalene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Perylene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Phenanthrene	mg/kg				<0.010	0.010	<0.010	0.010	<0.010	0.010	6865544
Pyrene	mg/kg				<0.010	0.010	<0.040 (1)	0.040	<0.010	0.010	6865544
Surrogate Recovery (%)											
Leachable D10-Anthracene	%	86		6876292							
Leachable D14-Terphenyl	%	65		6876292							
Leachable D8-Acenaphthylene	%	83		6876292							
D10-Anthracene	%				77		79		80		6865544
D14-Terphenyl (FS)	%				86		84		86		6865544
D8-Acenaphthylene	%				87		93		85		6865544
RDL = Reportable Detection Limit											
QC Batch = Quality Control Batch											
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.											



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Report Date: 2020/08/12

CBCL Limited
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POLYCHLORINATED BIPHENYLS BY GC-ECD (SOIL)

BV Labs ID		NFD881	NFD882	NFE001		NFE002		
Sampling Date		2020/07/23 11:00	2020/07/23 11:15	2020/07/23 11:30		2020/07/23 12:00		
	UNITS	VI-10	VI-11	VI-12	QC Batch	VI-13	RDL	QC Batch
PCBs								
Aroclor 1016	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1221	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1232	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1248	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1242	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1254	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Aroclor 1260	ug/g	<0.050	<0.050	<0.050	6864205	<0.050	0.050	6864205
Calculated Total PCB	ug/g	<0.050	<0.050	<0.050	6861083	<0.050	0.050	6858711
Surrogate Recovery (%)								
Decachlorobiphenyl	%	97	97	96	6864205	95		6864205
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								



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GENERAL COMMENTS

TEH Analysis: Silica gel clean-up performed prior to analysis as per client request.

Results relate only to the items tested.

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BV Labs Job #: C0I8518

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Site Location: VARDYS ISLAND

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
	6863505	KKE	RPD	Moisture	2020/07/31	3.6		%	25
	6863560	SHL	Matrix Spike	Isobutylbenzene - Volatile	2020/07/30		102	%	60 - 130
				Benzene	2020/07/30		81	%	60 - 130
				Toluene	2020/07/30		78	%	60 - 130
				Ethylbenzene	2020/07/30		81	%	60 - 130
				Total Xylenes	2020/07/30		92	%	60 - 130
	6863560	SHL	Spiked Blank	Isobutylbenzene - Volatile	2020/07/30		97	%	60 - 130
				Benzene	2020/07/30		92	%	60 - 140
				Toluene	2020/07/30		88	%	60 - 140
				Ethylbenzene	2020/07/30		89	%	60 - 140
				Total Xylenes	2020/07/30		102	%	60 - 140
	6863560	SHL	Method Blank	Isobutylbenzene - Volatile	2020/07/30		98	%	60 - 130
				Benzene	2020/07/30	<0.025		mg/kg	
				Toluene	2020/07/30	<0.050		mg/kg	
				Ethylbenzene	2020/07/30	<0.025		mg/kg	
				Total Xylenes	2020/07/30	<0.050		mg/kg	
				C6 - C10 (less BTEX)	2020/07/30	<2.5		mg/kg	
	6863560	SHL	RPD	Benzene	2020/07/30	NC		%	50
				Toluene	2020/07/30	NC		%	50
				Ethylbenzene	2020/07/30	NC		%	50
				Total Xylenes	2020/07/30	NC		%	50
				C6 - C10 (less BTEX)	2020/07/30	NC		%	50
	6863857	KKE	RPD [NFE002-01]	Moisture	2020/07/31	0.26		%	25
	6864205	RGE	Matrix Spike	Decachlorobiphenyl	2020/07/31		92	%	70 - 130
				Aroclor 1254	2020/07/31		97	%	70 - 130
	6864205	RGE	Spiked Blank	Decachlorobiphenyl	2020/07/31		97	%	70 - 130
				Aroclor 1254	2020/07/31		106	%	70 - 130
	6864205	RGE	Method Blank	Decachlorobiphenyl	2020/07/31		96	%	70 - 130
				Aroclor 1016	2020/07/31	<0.050		ug/g	
				Aroclor 1221	2020/07/31	<0.050		ug/g	
				Aroclor 1232	2020/07/31	<0.050		ug/g	
				Aroclor 1248	2020/07/31	<0.050		ug/g	
				Aroclor 1242	2020/07/31	<0.050		ug/g	
				Aroclor 1254	2020/07/31	<0.050		ug/g	
				Aroclor 1260	2020/07/31	<0.050		ug/g	
	6864205	RGE	RPD	Aroclor 1016	2020/07/31	NC		%	50
				Aroclor 1221	2020/07/31	NC		%	50
				Aroclor 1232	2020/07/31	NC		%	50
				Aroclor 1248	2020/07/31	NC		%	50
				Aroclor 1242	2020/07/31	NC		%	50
				Aroclor 1254	2020/07/31	NC		%	50
				Aroclor 1260	2020/07/31	NC		%	50
	6865544	KKE	Matrix Spike	D10-Anthracene	2020/07/31		85	%	50 - 130
				D14-Terphenyl (F5)	2020/07/31		85	%	50 - 130
				D8-Acenaphthylene	2020/07/31		95	%	50 - 130
				1-Methylnaphthalene	2020/07/31		86	%	50 - 130
				2-Methylnaphthalene	2020/07/31		93	%	50 - 130
				Acenaphthene	2020/07/31		95	%	50 - 130
				Acenaphthylene	2020/07/31		97	%	50 - 130
				Anthracene	2020/07/31		100	%	50 - 130
				Benzo(a)anthracene	2020/07/31		109	%	50 - 130
				Benzo(a)pyrene	2020/07/31		112	%	50 - 130
				Benzo(b)fluoranthene	2020/07/31		122	%	50 - 130
				Benzo(g,h,i)perylene	2020/07/31		110	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6865544	KKE	Spiked Blank	Benzo(j)fluoranthene	2020/07/31		105	%	50 - 130
			Benzo(k)fluoranthene	2020/07/31		107	%	50 - 130
			Chrysene	2020/07/31		102	%	50 - 130
			Dibenzo(a,h)anthracene	2020/07/31		115	%	50 - 130
			Fluoranthene	2020/07/31		105	%	50 - 130
			Fluorene	2020/07/31		97	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/07/31		108	%	50 - 130
			Naphthalene	2020/07/31		90	%	50 - 130
			Perylene	2020/07/31		105	%	50 - 130
			Phenanthrene	2020/07/31		102	%	50 - 130
			Pyrene	2020/07/31		104	%	50 - 130
			D10-Anthracene	2020/07/31		89	%	50 - 130
			D14-Terphenyl (F5)	2020/07/31		88	%	50 - 130
			D8-Acenaphthylene	2020/07/31		98	%	50 - 130
			1-Methylnaphthalene	2020/07/31		88	%	50 - 130
			2-Methylnaphthalene	2020/07/31		95	%	50 - 130
			Acenaphthene	2020/07/31		100	%	50 - 130
			Acenaphthylene	2020/07/31		102	%	50 - 130
			Anthracene	2020/07/31		102	%	50 - 130
			Benzo(a)anthracene	2020/07/31		109	%	50 - 130
			Benzo(a)pyrene	2020/07/31		113	%	50 - 130
			Benzo(b)fluoranthene	2020/07/31		119	%	50 - 130
			Benzo(g,h,i)perylene	2020/07/31		111	%	50 - 130
			Benzo(j)fluoranthene	2020/07/31		107	%	50 - 130
			Benzo(k)fluoranthene	2020/07/31		113	%	50 - 130
			Chrysene	2020/07/31		103	%	50 - 130
			Dibenzo(a,h)anthracene	2020/07/31		114	%	50 - 130
			Fluoranthene	2020/07/31		106	%	50 - 130
			Fluorene	2020/07/31		103	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2020/07/31		109	%	50 - 130
			Naphthalene	2020/07/31		93	%	50 - 130
			Perylene	2020/07/31		107	%	50 - 130
			Phenanthrene	2020/07/31		104	%	50 - 130
			Pyrene	2020/07/31		104	%	50 - 130
6865544	KKE	Method Blank	D10-Anthracene	2020/07/31		103	%	50 - 130
			D14-Terphenyl (F5)	2020/07/31		98	%	50 - 130
			D8-Acenaphthylene	2020/07/31		101	%	50 - 130
			1-Methylnaphthalene	2020/07/31	<0.010		mg/kg	
			2-Methylnaphthalene	2020/07/31	<0.010		mg/kg	
			Acenaphthene	2020/07/31	<0.010		mg/kg	
			Acenaphthylene	2020/07/31	<0.010		mg/kg	
			Anthracene	2020/07/31	<0.010		mg/kg	
			Benzo(a)anthracene	2020/07/31	<0.010		mg/kg	
			Benzo(a)pyrene	2020/07/31	<0.010		mg/kg	
			Benzo(b)fluoranthene	2020/07/31	<0.010		mg/kg	
			Benzo(g,h,i)perylene	2020/07/31	<0.010		mg/kg	
			Benzo(j)fluoranthene	2020/07/31	<0.010		mg/kg	
			Benzo(k)fluoranthene	2020/07/31	<0.010		mg/kg	
			Chrysene	2020/07/31	<0.010		mg/kg	
			Dibenzo(a,h)anthracene	2020/07/31	<0.010		mg/kg	
			Fluoranthene	2020/07/31	<0.010		mg/kg	
			Fluorene	2020/07/31	<0.010		mg/kg	
			Indeno(1,2,3-cd)pyrene	2020/07/31	<0.010		mg/kg	
			Naphthalene	2020/07/31	<0.010		mg/kg	



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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6865544	KKE	RPD	Perylene	2020/07/31	<0.010		mg/kg	
			Phenanthrene	2020/07/31	<0.010		mg/kg	
			Pyrene	2020/07/31	<0.010		mg/kg	
			1-Methylnaphthalene	2020/07/31	NC		%	50
			2-Methylnaphthalene	2020/07/31	NC		%	50
			Acenaphthene	2020/07/31	NC		%	50
			Acenaphthylene	2020/07/31	3.9		%	50
			Anthracene	2020/07/31	22		%	50
			Benzo(a)anthracene	2020/07/31	0		%	50
			Benzo(a)pyrene	2020/07/31	NC (1)		%	50
			Benzo(b)fluoranthene	2020/07/31	20		%	50
			Benzo(g,h,i)perylene	2020/07/31	27		%	50
			Benzo(j)fluoranthene	2020/07/31	40		%	50
			Benzo(k)fluoranthene	2020/07/31	0		%	50
			Chrysene	2020/07/31	1.7		%	50
			Dibenzo(a,h)anthracene	2020/07/31	NC		%	50
			Fluoranthene	2020/07/31	2.3		%	50
			Fluorene	2020/07/31	NC		%	50
			Indeno(1,2,3-cd)pyrene	2020/07/31	39		%	50
			Naphthalene	2020/07/31	7.3		%	50
6865678	DBF	Matrix Spike	Perylene	2020/07/31	NC		%	50
			Phenanthrene	2020/07/31	2.3		%	50
			Pyrene	2020/07/31	4.0		%	50
			Isobutylbenzene - Extractable	2020/07/31		95	%	60 - 130
			n-Dotriacontane - Extractable	2020/07/31		93	%	60 - 130
6865678	DBF	Spiked Blank	>C10-C16 Hydrocarbons	2020/07/31		95	%	30 - 130
			>C16-C21 Hydrocarbons	2020/07/31		91	%	30 - 130
			>C21-<C32 Hydrocarbons	2020/07/31		NC	%	30 - 130
			Isobutylbenzene - Extractable	2020/07/31		106	%	60 - 130
			n-Dotriacontane - Extractable	2020/07/31		106	%	60 - 130
6865678	DBF	Method Blank	>C10-C16 Hydrocarbons	2020/07/31		110	%	60 - 130
			>C16-C21 Hydrocarbons	2020/07/31		100	%	60 - 130
			>C21-<C32 Hydrocarbons	2020/07/31		125	%	60 - 130
			Isobutylbenzene - Extractable	2020/07/31		98	%	60 - 130
			n-Dotriacontane - Extractable	2020/07/31		98	%	60 - 130
6865678	DBF	RPD	>C10-C16 Hydrocarbons	2020/07/31	<10		mg/kg	
			>C16-C21 Hydrocarbons	2020/07/31	<10		mg/kg	
			>C21-<C32 Hydrocarbons	2020/07/31	<15		mg/kg	
			>C10-C16 Hydrocarbons	2020/07/31	NC		%	50
6865678	DBF	RPD	>C16-C21 Hydrocarbons	2020/07/31	17		%	50
			>C21-<C32 Hydrocarbons	2020/07/31	13		%	50
6865720	BAN	Matrix Spike	Acid Extractable Antimony (Sb)	2020/08/01		103	%	75 - 125
			Acid Extractable Arsenic (As)	2020/08/01		NC	%	75 - 125
			Acid Extractable Barium (Ba)	2020/08/01		113	%	75 - 125
			Acid Extractable Beryllium (Be)	2020/08/01		112	%	75 - 125
			Acid Extractable Bismuth (Bi)	2020/08/01		NC	%	75 - 125
			Acid Extractable Boron (B)	2020/08/01		96	%	75 - 125
			Acid Extractable Cadmium (Cd)	2020/08/01		NC	%	75 - 125
			Acid Extractable Chromium (Cr)	2020/08/01		112	%	75 - 125
			Acid Extractable Cobalt (Co)	2020/08/01		115	%	75 - 125
			Acid Extractable Copper (Cu)	2020/08/01		NC	%	75 - 125
			Acid Extractable Lead (Pb)	2020/08/01		NC	%	75 - 125
			Acid Extractable Lithium (Li)	2020/08/01		NC	%	75 - 125
			Acid Extractable Manganese (Mn)	2020/08/01		NC	%	75 - 125



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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6865720	BAN	Spiked Blank	Acid Extractable Mercury (Hg)	2020/08/01		104	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2020/08/01		NC	%	75 - 125
			Acid Extractable Nickel (Ni)	2020/08/01		118	%	75 - 125
			Acid Extractable Rubidium (Rb)	2020/08/01		NC	%	75 - 125
			Acid Extractable Selenium (Se)	2020/08/01		116	%	75 - 125
			Acid Extractable Silver (Ag)	2020/08/01		115	%	75 - 125
			Acid Extractable Strontium (Sr)	2020/08/01		115	%	75 - 125
			Acid Extractable Thallium (Tl)	2020/08/01		117	%	75 - 125
			Acid Extractable Tin (Sn)	2020/08/01		NC	%	75 - 125
			Acid Extractable Uranium (U)	2020/08/01		NC	%	75 - 125
			Acid Extractable Vanadium (V)	2020/08/01		115	%	75 - 125
			Acid Extractable Zinc (Zn)	2020/08/01		NC	%	75 - 125
			Acid Extractable Antimony (Sb)	2020/08/01		103	%	75 - 125
			Acid Extractable Arsenic (As)	2020/08/01		103	%	75 - 125
			Acid Extractable Barium (Ba)	2020/08/01		105	%	75 - 125
			Acid Extractable Beryllium (Be)	2020/08/01		108	%	75 - 125
			Acid Extractable Bismuth (Bi)	2020/08/01		105	%	75 - 125
			Acid Extractable Boron (B)	2020/08/01		101	%	75 - 125
			Acid Extractable Cadmium (Cd)	2020/08/01		105	%	75 - 125
			Acid Extractable Chromium (Cr)	2020/08/01		106	%	75 - 125
			Acid Extractable Cobalt (Co)	2020/08/01		101	%	75 - 125
			Acid Extractable Copper (Cu)	2020/08/01		104	%	75 - 125
			Acid Extractable Lead (Pb)	2020/08/01		105	%	75 - 125
			Acid Extractable Lithium (Li)	2020/08/01		112	%	75 - 125
			Acid Extractable Manganese (Mn)	2020/08/01		101	%	75 - 125
			Acid Extractable Mercury (Hg)	2020/08/01		103	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2020/08/01		106	%	75 - 125
			Acid Extractable Nickel (Ni)	2020/08/01		104	%	75 - 125
			Acid Extractable Rubidium (Rb)	2020/08/01		104	%	75 - 125
			Acid Extractable Selenium (Se)	2020/08/01		123	%	75 - 125
			Acid Extractable Silver (Ag)	2020/08/01		105	%	75 - 125
			Acid Extractable Strontium (Sr)	2020/08/01		106	%	75 - 125
			Acid Extractable Thallium (Tl)	2020/08/01		102	%	75 - 125
			Acid Extractable Tin (Sn)	2020/08/01		101	%	75 - 125
			Acid Extractable Uranium (U)	2020/08/01		105	%	75 - 125
			Acid Extractable Vanadium (V)	2020/08/01		105	%	75 - 125
			Acid Extractable Zinc (Zn)	2020/08/01		104	%	75 - 125
6865720	BAN	Method Blank	Acid Extractable Aluminum (Al)	2020/08/01	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2020/08/01	<5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Boron (B)	2020/08/01	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2020/08/01	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2020/08/01	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2020/08/01	<50		mg/kg	
			Acid Extractable Lead (Pb)	2020/08/01	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2020/08/01	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2020/08/01	<2.0		mg/kg	



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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6865720	BAN	RPD	Acid Extractable Nickel (Ni)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2020/08/01	<0.50		mg/kg	
			Acid Extractable Silver (Ag)	2020/08/01	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2020/08/01	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2020/08/01	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2020/08/01	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2020/08/01	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2020/08/01	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2020/08/01	<5.0		mg/kg	
			Acid Extractable Aluminum (Al)	2020/08/01	4.7		%	35
			Acid Extractable Antimony (Sb)	2020/08/01	NC		%	35
			Acid Extractable Arsenic (As)	2020/08/01	1.0		%	35
			Acid Extractable Barium (Ba)	2020/08/01	1.4		%	35
			Acid Extractable Beryllium (Be)	2020/08/01	3.9		%	35
			Acid Extractable Bismuth (Bi)	2020/08/01	2.5		%	35
			Acid Extractable Boron (B)	2020/08/01	NC		%	35
			Acid Extractable Cadmium (Cd)	2020/08/01	3.1		%	35
			Acid Extractable Chromium (Cr)	2020/08/01	1.6		%	35
			Acid Extractable Cobalt (Co)	2020/08/01	14		%	35
			Acid Extractable Copper (Cu)	2020/08/01	1.1		%	35
			Acid Extractable Iron (Fe)	2020/08/01	1.5		%	35
			Acid Extractable Lead (Pb)	2020/08/01	2.1		%	35
			Acid Extractable Lithium (Li)	2020/08/01	4.3		%	35
			Acid Extractable Manganese (Mn)	2020/08/01	2.5		%	35
			Acid Extractable Mercury (Hg)	2020/08/01	NC		%	35
			Acid Extractable Molybdenum (Mo)	2020/08/01	0.55		%	35
			Acid Extractable Nickel (Ni)	2020/08/01	14		%	35
			Acid Extractable Rubidium (Rb)	2020/08/01	1.0		%	35
			Acid Extractable Selenium (Se)	2020/08/01	3.9		%	35
			Acid Extractable Silver (Ag)	2020/08/01	1.2		%	35
			Acid Extractable Strontium (Sr)	2020/08/01	2.8		%	35
			Acid Extractable Thallium (Tl)	2020/08/01	1.5		%	35
			Acid Extractable Tin (Sn)	2020/08/01	3.7		%	35
			Acid Extractable Uranium (U)	2020/08/01	2.0		%	35
			Acid Extractable Vanadium (V)	2020/08/01	3.9		%	35
			Acid Extractable Zinc (Zn)	2020/08/01	0.35		%	35
6869312	EPU	Method Blank	Sample Weight (as received)	2020/08/05	NA		g	
6869312	EPU	RPD [NFD881-01]	Sample Weight (as received)	2020/08/05	0.15		%	N/A
6871621	BAN	Matrix Spike [NFD881-01]	Leachable Antimony (Sb)	2020/08/07		104	%	75 - 125
			Leachable Arsenic (As)	2020/08/07		98	%	75 - 125
			Leachable Barium (Ba)	2020/08/07		101	%	75 - 125
			Leachable Beryllium (Be)	2020/08/07		100	%	75 - 125
			Leachable Boron (B)	2020/08/07		96	%	75 - 125
			Leachable Cadmium (Cd)	2020/08/07		98	%	75 - 125
			Leachable Chromium (Cr)	2020/08/07		97	%	75 - 125
			Leachable Cobalt (Co)	2020/08/07		97	%	75 - 125
			Leachable Copper (Cu)	2020/08/07		96	%	75 - 125
			Leachable Lead (Pb)	2020/08/07		97	%	75 - 125
			Leachable Lithium (Li)	2020/08/07		104	%	75 - 125
			Leachable Manganese (Mn)	2020/08/07		98	%	75 - 125
			Leachable Molybdenum (Mo)	2020/08/07		105	%	75 - 125
			Leachable Nickel (Ni)	2020/08/07		98	%	75 - 125
			Leachable Selenium (Se)	2020/08/07		96	%	75 - 125

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QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6871621	BAN	Spiked Blank	Leachable Silver (Ag)	2020/08/07		98	%	75 - 125	
			Leachable Strontium (Sr)	2020/08/07		102	%	75 - 125	
			Leachable Thallium (Tl)	2020/08/07		98	%	75 - 125	
			Leachable Tin (Sn)	2020/08/07		100	%	75 - 125	
			Leachable Uranium (U)	2020/08/07		105	%	75 - 125	
			Leachable Vanadium (V)	2020/08/07		99	%	75 - 125	
			Leachable Zinc (Zn)	2020/08/07		97	%	75 - 125	
			Leachable Antimony (Sb)	2020/08/07		107	%	75 - 125	
			Leachable Arsenic (As)	2020/08/07		97	%	75 - 125	
			Leachable Barium (Ba)	2020/08/07		100	%	75 - 125	
			Leachable Beryllium (Be)	2020/08/07		96	%	75 - 125	
			Leachable Boron (B)	2020/08/07		93	%	75 - 125	
			Leachable Cadmium (Cd)	2020/08/07		96	%	75 - 125	
			Leachable Chromium (Cr)	2020/08/07		95	%	75 - 125	
			Leachable Cobalt (Co)	2020/08/07		96	%	75 - 125	
			Leachable Copper (Cu)	2020/08/07		94	%	75 - 125	
			Leachable Lead (Pb)	2020/08/07		96	%	75 - 125	
			Leachable Lithium (Li)	2020/08/07		101	%	75 - 125	
			Leachable Manganese (Mn)	2020/08/07		98	%	75 - 125	
			Leachable Molybdenum (Mo)	2020/08/07		102	%	75 - 125	
			Leachable Nickel (Ni)	2020/08/07		96	%	75 - 125	
			Leachable Selenium (Se)	2020/08/07		95	%	75 - 125	
			Leachable Silver (Ag)	2020/08/07		96	%	75 - 125	
			Leachable Strontium (Sr)	2020/08/07		100	%	75 - 125	
			Leachable Thallium (Tl)	2020/08/07		96	%	75 - 125	
			Leachable Tin (Sn)	2020/08/07		101	%	75 - 125	
			Leachable Uranium (U)	2020/08/07		104	%	75 - 125	
			Leachable Vanadium (V)	2020/08/07		96	%	75 - 125	
			Leachable Zinc (Zn)	2020/08/07		98	%	75 - 125	
6871621	BAN	Method Blank	Leachable Aluminum (Al)	2020/08/07	<100			ug/L	
			Leachable Antimony (Sb)	2020/08/07	<20			ug/L	
			Leachable Arsenic (As)	2020/08/07	<20			ug/L	
			Leachable Barium (Ba)	2020/08/07	<50			ug/L	
			Leachable Beryllium (Be)	2020/08/07	<20			ug/L	
			Leachable Boron (B)	2020/08/07	<500			ug/L	
			Leachable Cadmium (Cd)	2020/08/07	<3.0			ug/L	
			Leachable Calcium (Ca)	2020/08/07	<1000			ug/L	
			Leachable Chromium (Cr)	2020/08/07	<20			ug/L	
			Leachable Cobalt (Co)	2020/08/07	<10			ug/L	
			Leachable Copper (Cu)	2020/08/07	<20			ug/L	
			Leachable Iron (Fe)	2020/08/07	<500			ug/L	
			Leachable Lead (Pb)	2020/08/07	<5.0			ug/L	
			Leachable Lithium (Li)	2020/08/07	<20			ug/L	
			Leachable Magnesium (Mg)	2020/08/07	<1000			ug/L	
			Leachable Manganese (Mn)	2020/08/07	<20			ug/L	
			Leachable Molybdenum (Mo)	2020/08/07	<20			ug/L	
			Leachable Nickel (Ni)	2020/08/07	<20			ug/L	
			Leachable Potassium (K)	2020/08/07	<1000			ug/L	
			Leachable Selenium (Se)	2020/08/07	<10			ug/L	
			Leachable Silver (Ag)	2020/08/07	<5.0			ug/L	
			Leachable Strontium (Sr)	2020/08/07	<50			ug/L	
			Leachable Thallium (Tl)	2020/08/07	<1.0			ug/L	
			Leachable Tin (Sn)	2020/08/07	<20			ug/L	
			Leachable Uranium (U)	2020/08/07	<1.0			ug/L	



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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6871621	BAN	RPD [NFD881-01]	Leachable Vanadium (V)	2020/08/07	<20		ug/L	
			Leachable Zinc (Zn)	2020/08/07	<50		ug/L	
			Leachable Aluminum (Al)	2020/08/07	11		%	35
			Leachable Antimony (Sb)	2020/08/07	NC		%	35
			Leachable Arsenic (As)	2020/08/07	NC		%	35
			Leachable Barium (Ba)	2020/08/07	22		%	35
			Leachable Beryllium (Be)	2020/08/07	NC		%	35
			Leachable Boron (B)	2020/08/07	NC		%	35
			Leachable Cadmium (Cd)	2020/08/07	NC		%	35
			Leachable Calcium (Ca)	2020/08/07	1.6		%	35
			Leachable Chromium (Cr)	2020/08/07	NC		%	35
			Leachable Cobalt (Co)	2020/08/07	NC		%	35
			Leachable Copper (Cu)	2020/08/07	NC		%	35
			Leachable Iron (Fe)	2020/08/07	7.0		%	35
			Leachable Lead (Pb)	2020/08/07	8.4		%	35
			Leachable Lithium (Li)	2020/08/07	NC		%	35
			Leachable Magnesium (Mg)	2020/08/07	1.2		%	35
			Leachable Manganese (Mn)	2020/08/07	NC		%	35
			Leachable Molybdenum (Mo)	2020/08/07	NC		%	35
			Leachable Nickel (Ni)	2020/08/07	NC		%	35
			Leachable Potassium (K)	2020/08/07	7.4		%	35
			Leachable Selenium (Se)	2020/08/07	NC		%	35
			Leachable Silver (Ag)	2020/08/07	NC		%	35
			Leachable Strontium (Sr)	2020/08/07	9.8		%	35
			Leachable Thallium (Tl)	2020/08/07	NC		%	35
			Leachable Tin (Sn)	2020/08/07	NC		%	35
			Leachable Uranium (U)	2020/08/07	NC		%	35
			Leachable Vanadium (V)	2020/08/07	NC		%	35
			Leachable Zinc (Zn)	2020/08/07	27		%	35
6876292	KKE	Matrix Spike [NFD881-01]	Leachable 1-Methylnaphthalene	2020/08/08		73	%	50 - 130
			Leachable 2-Methylnaphthalene	2020/08/08		74	%	50 - 130
			Leachable Acenaphthene	2020/08/08		85	%	50 - 130
			Leachable Acenaphthylene	2020/08/08		68	%	50 - 130
			Leachable Anthracene	2020/08/08		75	%	50 - 130
			Leachable Benzo(a)anthracene	2020/08/08		73	%	50 - 130
			Leachable Benzo(a)pyrene	2020/08/08		76	%	50 - 130
			Leachable Benzo(b)fluoranthene	2020/08/08		85	%	50 - 130
			Leachable Benzo(g,h,i)perylene	2020/08/08		76	%	50 - 130
			Leachable Benzo(j)fluoranthene	2020/08/08		81	%	50 - 130
			Leachable Benzo(k)fluoranthene	2020/08/08		82	%	50 - 130
			Leachable Chrysene	2020/08/08		70	%	50 - 130
			Leachable D10-Anthracene	2020/08/08		86	%	50 - 130
			Leachable D14-Terphenyl	2020/08/08		84	%	50 - 130
			Leachable D8-Acenaphthylene	2020/08/08		91	%	50 - 130
			Leachable Dibenzo(a,h)anthracene	2020/08/08		76	%	50 - 130
			Leachable Fluoranthene	2020/08/08		81	%	50 - 130
			Leachable Fluorene	2020/08/08		74	%	50 - 130
			Leachable Indeno(1,2,3-cd)pyrene	2020/08/08		70	%	50 - 130
			Leachable Naphthalene	2020/08/08		123	%	50 - 130
			Leachable Perylene	2020/08/08		76	%	50 - 130
			Leachable Phenanthrene	2020/08/08		84	%	50 - 130
			Leachable Pyrene	2020/08/08		78	%	50 - 130
6876292	KKE	Leachate Blank	Leachable 1-Methylnaphthalene	2020/08/08	<0.50		ug/L	
			Leachable 2-Methylnaphthalene	2020/08/08	<0.50		ug/L	



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6876292	KKE	Spiked Blank	Leachable Acenaphthene	2020/08/08	<0.10		ug/L	
			Leachable Acenaphthylene	2020/08/08	<0.10		ug/L	
			Leachable Anthracene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(a)anthracene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(a)pyrene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(b)fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(g,h,i)perylene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(j)fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(k)fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Chrysene	2020/08/08	<0.10		ug/L	
			Leachable D10-Anthracene	2020/08/08		100	%	50 - 130
			Leachable D14-Terphenyl	2020/08/08		76	%	50 - 130
			Leachable D8-Acenaphthylene	2020/08/08		96	%	50 - 130
			Leachable Dibenzo(a,h)anthracene	2020/08/08	<0.10		ug/L	
			Leachable Fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Fluorene	2020/08/08	<0.10		ug/L	
			Leachable Indeno(1,2,3-cd)pyrene	2020/08/08	<0.10		ug/L	
			Leachable Naphthalene	2020/08/08	<2.0		ug/L	
			Leachable Perylene	2020/08/08	<0.10		ug/L	
			Leachable Phenanthrene	2020/08/08	<0.10		ug/L	
			Leachable Pyrene	2020/08/08	<0.10		ug/L	
			Leachable 1-Methylnaphthalene	2020/08/08		81	%	50 - 130
			Leachable 2-Methylnaphthalene	2020/08/08		91	%	50 - 130
			Leachable Acenaphthene	2020/08/08		98	%	50 - 130
			Leachable Acenaphthylene	2020/08/08		74	%	50 - 130
			Leachable Anthracene	2020/08/08		79	%	50 - 130
			Leachable Benzo(a)anthracene	2020/08/08		78	%	50 - 130
			Leachable Benzo(a)pyrene	2020/08/08		93	%	50 - 130
			Leachable Benzo(b)fluoranthene	2020/08/08		105	%	50 - 130
			Leachable Benzo(g,h,i)perylene	2020/08/08		96	%	50 - 130
			Leachable Benzo(j)fluoranthene	2020/08/08		94	%	50 - 130
			Leachable Benzo(k)fluoranthene	2020/08/08		95	%	50 - 130
			Leachable Chrysene	2020/08/08		82	%	50 - 130
			Leachable D10-Anthracene	2020/08/08		96	%	50 - 130
			Leachable D14-Terphenyl	2020/08/08		102	%	50 - 130
			Leachable D8-Acenaphthylene	2020/08/08		99	%	50 - 130
			Leachable Dibenzo(a,h)anthracene	2020/08/08		87	%	50 - 130
			Leachable Fluoranthene	2020/08/08		86	%	50 - 130
			Leachable Fluorene	2020/08/08		62	%	50 - 130
			Leachable Indeno(1,2,3-cd)pyrene	2020/08/08		89	%	50 - 130
			Leachable Naphthalene	2020/08/08		89	%	50 - 130
			Leachable Perylene	2020/08/08		88	%	50 - 130
			Leachable Phenanthrene	2020/08/08		96	%	50 - 130
			Leachable Pyrene	2020/08/08		90	%	50 - 130
6876292	KKE	Method Blank	Leachable 1-Methylnaphthalene	2020/08/08	<0.50		ug/L	
			Leachable 2-Methylnaphthalene	2020/08/08	<0.50		ug/L	
			Leachable Acenaphthene	2020/08/08	<0.10		ug/L	
			Leachable Acenaphthylene	2020/08/08	<0.10		ug/L	
			Leachable Anthracene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(a)anthracene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(a)pyrene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(b)fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(g,h,i)perylene	2020/08/08	<0.10		ug/L	
			Leachable Benzo(j)fluoranthene	2020/08/08	<0.10		ug/L	



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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6876292	KKE	RPD [NFD881-01]	Leachable Benzo(k)fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Chrysene	2020/08/08	<0.10		ug/L	
			Leachable D10-Anthracene	2020/08/08		92	%	50 - 130
			Leachable D14-Terphenyl	2020/08/08		98	%	50 - 130
			Leachable D8-Acenaphthylene	2020/08/08		96	%	50 - 130
			Leachable Dibenzo(a,h)anthracene	2020/08/08	<0.10		ug/L	
			Leachable Fluoranthene	2020/08/08	<0.10		ug/L	
			Leachable Fluorene	2020/08/08	<0.10		ug/L	
			Leachable Indeno(1,2,3-cd)pyrene	2020/08/08	<0.10		ug/L	
			Leachable Naphthalene	2020/08/08	<2.0		ug/L	
			Leachable Perylene	2020/08/08	<0.10		ug/L	
			Leachable Phenanthrene	2020/08/08	<0.10		ug/L	
			Leachable Pyrene	2020/08/08	<0.10		ug/L	
			Leachable 1-Methylnaphthalene	2020/08/08	NC		%	40
			Leachable 2-Methylnaphthalene	2020/08/08	NC		%	40
			Leachable Acenaphthene	2020/08/08	NC		%	40
			Leachable Acenaphthylene	2020/08/08	NC		%	40
			Leachable Anthracene	2020/08/08	NC		%	40
			Leachable Benzo(a)anthracene	2020/08/08	NC		%	40
			Leachable Benzo(a)pyrene	2020/08/08	NC		%	40
			Leachable Benzo(b)fluoranthene	2020/08/08	NC		%	40
			Leachable Benzo(g,h,i)perylene	2020/08/08	NC		%	40
			Leachable Benzo(j)fluoranthene	2020/08/08	NC		%	40
			Leachable Benzo(k)fluoranthene	2020/08/08	NC		%	40
			Leachable Chrysene	2020/08/08	NC		%	40
			Leachable Dibenzo(a,h)anthracene	2020/08/08	NC		%	40
			Leachable Fluoranthene	2020/08/08	NC		%	40
			Leachable Fluorene	2020/08/08	NC		%	40
			Leachable Indeno(1,2,3-cd)pyrene	2020/08/08	NC		%	40
			Leachable Naphthalene	2020/08/08	NC		%	40
			Leachable Perylene	2020/08/08	NC		%	40
			Leachable Phenanthrene	2020/08/08	NC		%	40
			Leachable Pyrene	2020/08/08	NC		%	40

N/A = Not Applicable

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

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

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

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 PAH RDL(s) due to matrix / co-extractive interference.



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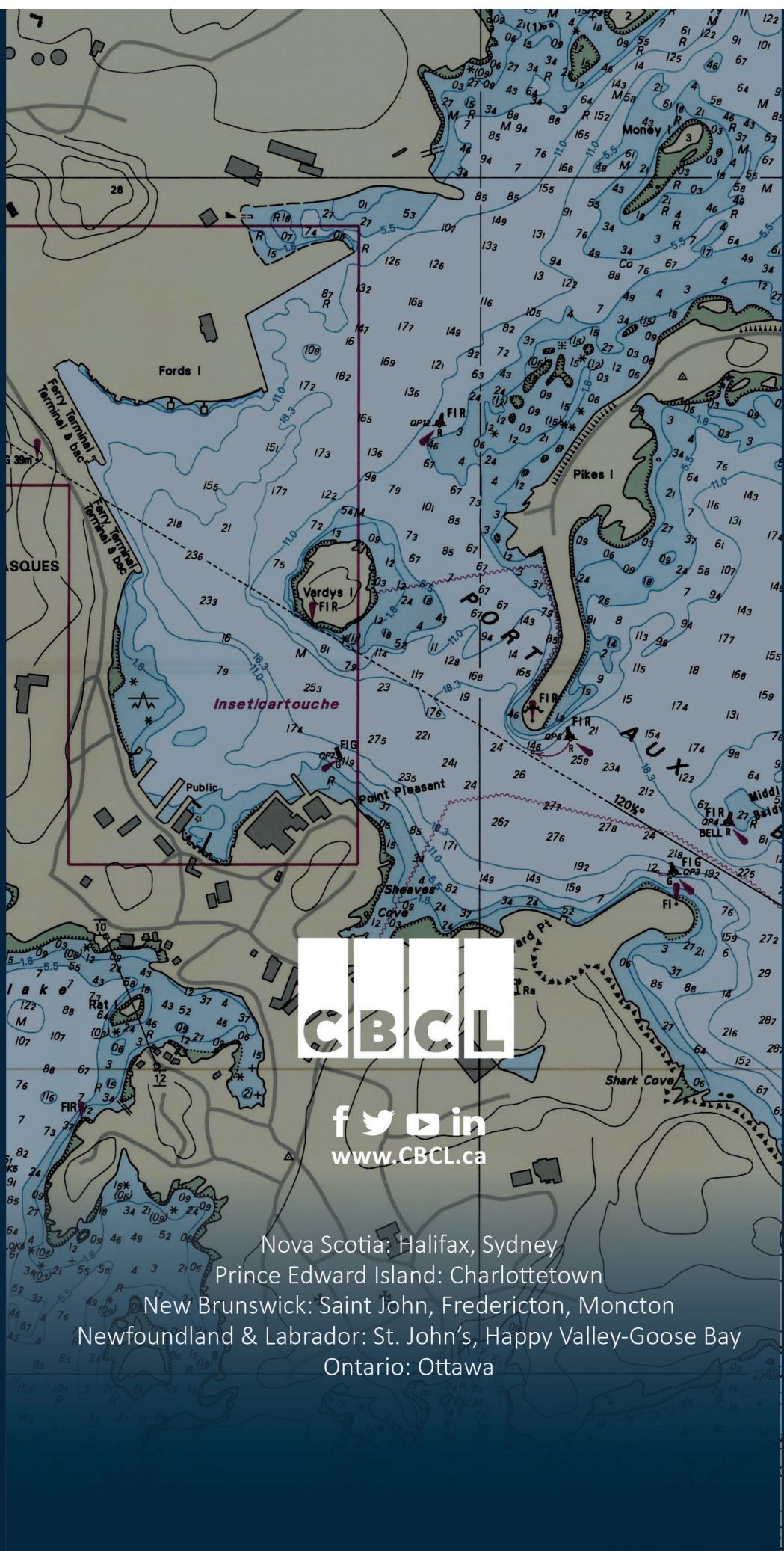
VALIDATION SIGNATURE PAGE

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)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



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