

Channel and Basin Re-dredging

Judique (Baxter's Cove)

Inverness County, N.S.

Project No. R.076167.001

Appendix "B" - Three (3) Marine Sediment Sampling Reports
(AECOM 2013; AMEC 2015 Letter; AMEC 2015)



**PWGSC PROJECT # R.056887.004
MARINE SEDIMENT SAMPLING PROGRAM
JUDIQUÉ (BAXTER'S COVE)
INVERNESS COUNTY, NOVA SCOTIA**

FINAL REPORT

Submitted to:
PWGSC
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Submitted by:
AECOM Canada Ltd.
164 Charlotte Street, Suite 2B
Sydney, Nova Scotia
B1P 1C3

January 2013

AECOM Project # 60272861



January 7, 2013

Rosalia Galante
PWGSC
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Dear Ms. Galante:

Re: Marine Sediment Sampling Program, Judique (Baxter's Cove), Inverness County, NS

AECOM Canada Ltd. (AECOM) is pleased to submit the enclosed Final Marine Sediment Sampling & Analysis Report, on work conducted in Judique (Baxter's Cove) Department of Fisheries and Oceans (DFO) Small Craft Harbour (SCH), in Inverness County, Nova Scotia. This Project has been completed under the Standing Offer Agreement whereby AECOM provides *Canadian Environmental Assessment Act* (CEAA) Assessment services to Public Works and Government Services Canada (PWGSC) (Standing Offer Contract # E0226-111592/002/PWD). A site visit was undertaken by AECOM and Connors Diving Services on July 31, 2012.

We trust this report meets your present requirements. Please contact the undersigned, should you have any questions or require additional details.

Sincerely,

Original Signed By

Jennifer Hood, B.Sc., PMP
Project Manager
AECOM Canada Ltd.
Direct Tel.: 902-595-2030
Direct Fax: 902-595-6020
E-mail: jennifer.hood@aecom.com



EXECUTIVE SUMMARY

Five (5) sediment samples and one (1) duplicate were collected by divers from Baxter's Cove, DFO SCH, located in Judique, Inverness County, NS. An additional four (4) samples and one (1) duplicate sample were collected by grab sample from a nearby historic disposal soil site (owner Ronald Graham, PID 50012517). The samples were submitted to Maxxam Analytics for detailed analyses. Results were compared to the Canadian Environmental Protection Act (CEPA) Disposal at Sea Regulations, CCME Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health in agricultural, residential/parkland, and commercial/industrial applications, Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 2.0 Risk-Based Screening Levels (RBSLs), CCME Canadian Water Quality Guidelines (WQG) for the Protection of Aquatic Life and/or Health Canada Canadian Guideline for Drinking Water Quality (CGDWQ).

Based on the analytical results the following exceedances were noted:

- JQ-39, JQ-48 and JQ-90 exceeded the CCME Soil Quality Guidelines (SQG) for the Protection of Environmental Health Criteria (freshwater) for the parameter phenanthrene
- JQ-48 and JQ-90 exceeded the CCME Interim Soil Quality Criteria for the parameter pyrene
- JQ-48 and JQ-90 exceeded the CCME IACR (Drinking Water Check) value of 1 for the protection of human health (potable water) for all land use scenarios
- JQ-48 and JQ-90 exceeded the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (freshwater) for the parameter leachable phenanthrene
- JQ-90 exceeded the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (freshwater) for the parameter leachable anthracene

Table ES1: Exceedance Table – Harbour

Parameter/Guideline	Sample ID					
	JQ-39	JQ-39-DUP	JQ-48	JQ-90	JQ-99	JQ-120
CEPA	-	-	-	-	-	-
CCME Soil Quality Guidelines						
PAHs	•		•	•	-	-
Metals	-		-	-	-	-
PCBs	-		-	-	-	-
DDT	-		-	-	-	-
Atlantic RBCA Tier 1 Version 2.0 RBSLs	-		-	-	-	-
CCME Water Quality Guidelines						
Leachable PAHs			•	•		



Table ES2: Exceedance Table – Historic Disposed Soil

Parameter/Guideline	Sample ID				
	JQ-01	JQ-01-DUP	JQ-02	JQ-03	JQ-04
CEPA	-		-	-	-
CCME Soil Quality Guidelines					
PAHs	-		-	-	-
Metals	-		-	-	-
PCBs	-		-	-	-
DDT	-		-	-	-
Atlantic RBCA Tier 1 Verison 2.0 RBSLs	-		-	-	-

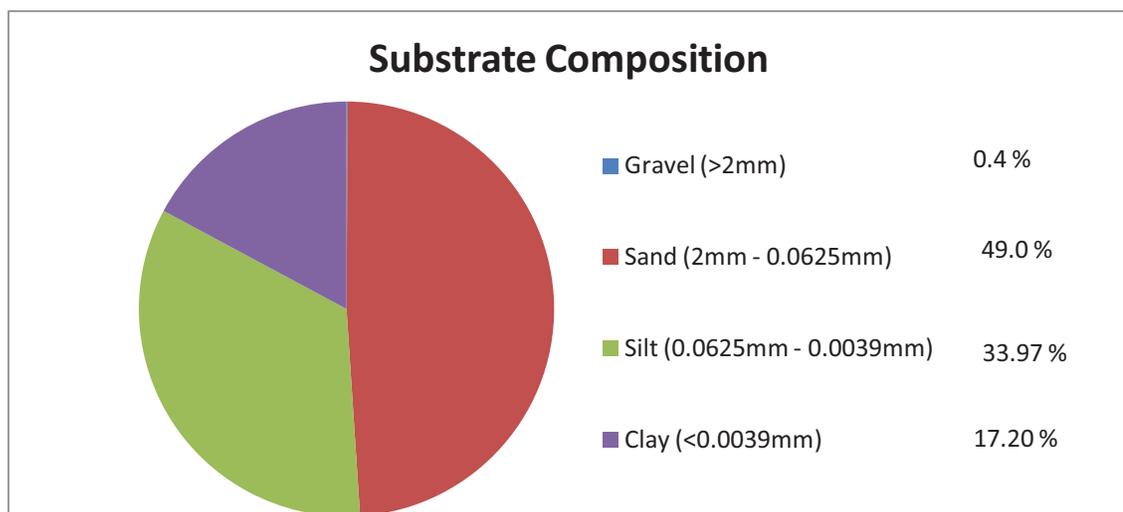


Figure ES1: Substrate Composition Averaged from Sampling Locations within Harbour

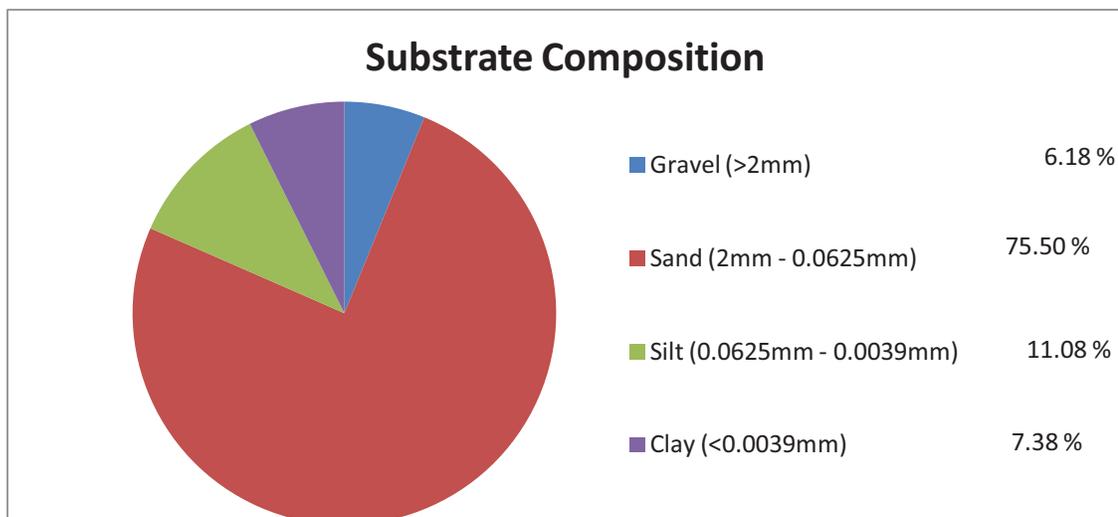


Figure ES2: Substrate Composition Summarized from Sampling Locations within Historic Disposal Pile



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1.0 INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), five (5) stations were sampled within the footprint of the proposed dredging area at the Baxter's Cove Department of Fisheries and Oceans Small Craft Harbour (DFO-SCH) in Judique (Baxter's Cove), Inverness County, Nova Scotia on July 31, 2012. Four (4) additional composite samples were collected from the nearby historic soil disposal site, located across the gravel access road from the SCH.

2.0 SCOPE AND METHODOLOGY

2.1 Site Plan

The selection of sample stations followed guidance provided in the Environmental Protection Series: *Users Guide to the Application Form for Ocean Disposal* (Report EPS 1/MA/1 December 1995). A random approach was implemented for selecting the locations of sampling stations in the proposed dredging area of the SCH. The unstratified area was divided into square blocks where at least five times as many blocks as the number of stations required was used. An online random number generator program (www.random.org) was then used to derive the sampling locations within the proposed dredge area (Figure 2.1). A systematic approach was implemented for selecting the location of sampling stations in the historic dredge site: the area was divided into a four (4) by four (4) grid and one (1) composite sample was collected from each quadrant, with equal sample volume collected from each block within the quadrant.

A detailed program design was prepared by AECOM and submitted to PWGSC on July 23, 2012 for review and approval prior to field program implementation. The field program was scheduled upon acceptance of the design.

Sample collection, preparation, and analyses were conducted in accordance with Environment Canada's publication *Guidance Document on Collection and Preparation of Sediments for Physicochemical Characterization and Biological Testing*, December 1994. Connors Diving Services was retained to collect the sediment samples from within the harbour and AECOM personnel collected samples from the historic disposal site. The sample collection field program was completed in accordance with guidelines defined by provincial Occupational Health and Safety Standards.

2.2 Sample Collection

The marine sediment samples were collected by divers and the disposal soil samples were collected by grab sample at the selected sampling stations. The divers used a handheld Garmin Global Positioning System (GPS) to georeference the sampling location coordinates that were derived prior to field program initiation. The coordinates collected did not always accurately illustrate the actual sampling location. Various factors play into skewing GPS results: the unit was accurate within 6 to 8 m during sample collection (the approximate size of sample blocks),

one (1) significant digit was displayed on the GPS unit compared with three (3) in the sample plan, and coordinates were converted between UTM, degrees minutes second, and decimal degree systems. As such, the divers use visual clues such as landmarks (wharfs, break water etc.) to verify their sample location in the field.

The soil sampler used a handheld GPS to collect location coordinates from the disposal site. Approximate centre coordinates for each of the four (1) sample quadrants are listed in Section 2.3. MSSP field reports that were completed in the field during the sampling program are listed in Appendix A. A photo log is also provided in Appendix A.

AECOM and Connors Diving personnel visited the site on July 31, 2012 to collect samples and record pertinent information regarding the site and samples collected. Weather at the time of collection was mostly sunny, 25° C, without precipitation or significant winds. The submerged sediment was well covered with vegetation, but not so much as to interfere with sediment collection; no changes were made to the sampling locations. The dredge pile was a 20 m by 20 m oval pile of sparsely vegetated soft sediment; no interferences to sample collection were noted.



Figure 2.1: Field Sampling locations, Judique (Baxter's Cove) DFO-SCH, July 31, 2012



Figure 2.2: Field Sampling Locations, Disposal Site near Baxter's Cove, July 31, 2012

In order to facilitate the determination of all disposal options, the analytical sample results were compared to the following:

- *Canadian Environmental Protection Act (CEPA) Disposal at Sea Regulations (formerly the Ocean Dumping Control Act) – Lower Level Screening Criteria.*
- *CCME Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health in agricultural, residential/parkland, and commercial/industrial applications.*
- *Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 2.0 Risk-Based Screening Levels (RBSLs).*
- *CCME Canadian Water Quality Guidelines (WQG) for the Protection of Aquatic Life*
- *Health Canada Canadian Guideline for Drinking Water Quality (CGDWQ)*

Table 2.1: Harbour Sample Coordinates

Sample ID	Sample Coordinates (decimal degrees, NAD 83)	
JQ-39	45.858111	-61.503444
JQ-48	45.858083	-61.503167
JQ-90	45.857722	-61.503306
JQ-99	45.857667	-61.503639
JQ-120	45.857528	-61.504056

Table 2.1: Historic Dredge Site Sample Coordinates

Sample ID	Sample Coordinates (decimal degrees, NAD 83)	
JQ-01	45.855139	-61.498778
JQ-02	45.855111	-61.498778
JQ-03	45.855056	-61.498722
JQ-04	45.855028	-61.498694

3.0 ANALYTICAL RESULTS

The analytical results of the marine sediment samples collected and analyzed from Baxter's Cove DFO SCH are summarized in Tables B.1 to B.10 (Appendix B) and discussed below.

Based on a review of the initial analytical results, it was decided through consultation with PWGSC that two (2) sediment samples JQ-48 and JQ-90 should undergo leachate analysis (Synthetic Precipitation Leaching Procedure [SPLP]; EPA Method 1312) for their exceedances of the CCME SQG for the Protection of Environment and Human Health. Results from these analyses were compared against the CCME Canadian WQG for the Protection of Aquatic Life and the Health Canada CGDWQ.

It is also of note that for the PAH and metals results, only those parameters for which there are established regulatory guidelines or those used in calculations are included in the tables. The complete set of analytical results, including laboratory QA/QC and Certificates of Analyses for all parameters tested, are provided in Appendix C.

3.1 PAH Concentrations

Total PAH levels are regulated at a value of less than or equal to 2.5 milligrams per kilogram (mg/kg) under CEPA in order to meet ocean disposal criteria. The CCME SQGs for the protection of human and environmental health stipulate guideline values for individual PAH compounds as well as the sum of individual PAH compounds for the calculation of Index of Additive Cancer Risk (IACR). A summary of the results compared to each of the referenced guidelines is provided in the following subsections.

Total PAH levels are regulated at a value of less than or equal to 2.5 milligrams per kilogram (mg/kg) under CEPA in order to meet ocean disposal criteria. The CCME SQGs for the protection of human and environmental health stipulate guideline values for individual PAH compounds as well as the sum of individual PAH compounds for the calculation of Index of Additive Cancer Risk (IACR). A summary of the results compared to each of the referenced guidelines for the harbour samples and the historic dredge site sample are provided in the following subsections.

3.1.1 Harbour Samples

CEPA Ocean Disposal Guideline

No sediment samples exceeded the CEPA Ocean Disposal Guideline for Total PAHs (Table B.1).

CCME SQGs – Human Health (Potable Water)

Sediment samples JQ-48 and JQ-90 exceeded the CCME IACR (Drinking Water Check) value of 1 or the CCME SQGs for the protection of human health (potable water) for all land use scenarios (Table B.1).

CCME SQG – Human Health (Direct Contact)

Guidance provided in the CCME Soil Quality Guidelines for the Protection of Environmental and Human Health (2008) indicates that for soil contaminated by coal tar or creosote mixtures, the calculated Benzo(a)pyrene TPE concentration for soil samples should be multiplied by an uncertainty factor (UF) of 3 prior to comparison with the SQGs for the protection of human health (direct contact) to account for carcinogenic potential of alkylated and other PAHs present for which a PEF does not currently exist, but which are likely to contribute to mixture carcinogenic potential.

Analytical results from the total extractable hydrocarbon (TEH) analysis revealed that creosote was not detected in two (2) of sediment samples analyzed. The lab was unable to confirm the presence of creosote in the remaining three (3) sediment samples. Results of all five (5) sediment samples fell below the CCME SQGs for the protection of human health (direct contact) for agricultural, residential/parkland, commercial and industrial land value of 5.3 mg/kg (Table B.1).

CCME SQGs – Environmental Health (Soil Contact), (Soil and Food Ingestion), and (Freshwater Life)

No sediment samples exceeded the CCME SQGs for the protection of environmental health (soil contact) and (soil and food ingestion).

Sediment samples JQ-39, JQ-48 and JQ-90 exceeded the CCME SQGs for the protection of environmental health (freshwater life) for all land use scenarios (Table B.1).

Leachate Discussion

CCME WQGs – Aquatic Life (Freshwater and Marine)

Sediment Samples JQ-48 and JQ-90 analyzed for leachate exceeded CCME WQGs for the Protection of Aquatic Life in freshwater environments for the parameter phenanthrene, JQ-90 also exceeded for the parameter anthracene. No exceedances of the CCME WQGs for the Protection of Aquatic Life in marine environments were noted (Table B.1b).

Health Canada CGDWQ (MAC and AO)

No sediment samples exceeded the CCME IACR (Drinking Water Check) value of 1.

No exceedances of Health Canada's CGDWQ were noted in the leachate samples analyzed (Table B.1b).

3.1.2 Historic Dredge Site Samples

CEPA Ocean Disposal Guideline

No soil samples exceeded the CEPA Ocean Disposal Guideline for Total PAHs (Table B.6).

CCME SQGs – Human Health (Potable Water)

No soil samples exceeded the CCME IACR (Drinking Water Check) value of 1 or the CCME SQGs for the protection of human health (potable water) for all land use scenarios (Table B.6)

CCME SQG – Human Health (Direct Contact)

Results of all four (4) sediment samples fell below the CCME SQGs for the protection of human health (direct contact) for agricultural, residential/parkland, commercial and industrial land value of 5.3 mg/kg (Table B.6). Analytical results from the total extractable hydrocarbon (TEH) analysis revealed that creosote was not detected in any of the four (4) of soil samples analyzed (Table B.6).

CCME SQGs – Environmental Health (Soil Contact), (Soil and Food Ingestion), and (Freshwater Life)

No soil samples exceeded the CCME SQGs for the protection of environmental health (soil contact) and (soil and food ingestion) (Table B.6).

No soil samples exceeded the CCME SQGs for the protection of environmental health (freshwater life) for all land use scenarios (Table B.6).

3.2 Metal Concentrations

Sample results were compared to the established CEPA Ocean Disposal Guidelines and the former Environment Canada Interim Rejection Limits. The results were also compared to the CCME SQGs for agricultural, residential/parkland and commercial/ industrial applications for land disposal.

No sediment or soil samples exceeded the CEPA Ocean Disposal Guidelines.

No sediment or soil samples exceeded the CCME SQGs for agricultural, residential/parkland or commercial/industrial applications (Table B.2).

3.3 Petroleum Hydrocarbon Concentrations

Although no guidelines for petroleum hydrocarbons currently exist for marine sediment, the analytical BTEX results of the five (5) sediment samples and four (4) soil samples collected were compared to the Atlantic RBCA Tier 1 Version 2.0 RBSLs and CCME SQGs for various land use applications. Silica gel clean-up was requested and completed prior to analysis.

Modified TPH values reflect the sum of the individual carbon fractions that resembles gasoline, diesel #2, and lube oil. Based on the resemblance results provided by the laboratory, the analytical results for Modified TPH were compared against the corresponding Atlantic RBCA Tier 1 Version 2.0 RBSLs.

Individual carbon fractions were reported below laboratory detection limits for all four (4) soil samples, with the exception of C21 - <C32. The C21 - <C32 fraction was reported below the CCME SQG for F3 (C16 – C32). Baseline was reached at C32 for each soil sample.

Individual carbon fractions were reported below laboratory detection limits for two (2) sediment samples, JQ-99 and JQ-120. The remaining three (3) sediment samples returned results above detection limits for carbon fractions C16 - <C21 and C21 - <C32. The C21 - <C32 fraction was reported below the CCME SQG for F3 (C16 – C32). Baseline was reached at C32 for each sediment sample that returned results higher than laboratory detection limits.

BTEX was not detected in any of the sediment or soil samples collected (Table B.3 and B.8).

The modified TPH values did not exceed the Atlantic RBCA Tier 1 Version 2.0 RBSLs for any of the soil or sediment samples.

3.4 PCB Concentrations

Total PCB values are regulated at a value of less than or equal to 0.1 mg/kg under CEPA in order to meet ocean disposal criteria. The CCME SQGs for PCBs in agricultural, residential/parkland, and industrial/commercial applications are regulated at values of 0.5, 1.3, and 33.0 mg/kg, respectively.

No samples exceeded the CEPA ocean disposal guideline.

No samples exceeded the CCME SQGs for all land use applications (Table B.4 and B.9).

3.5 DDT Concentrations

Total DDT which refers to the sum of DDE, DDD, and DDT concentrations is regulated under the CCME SQGs for agricultural, residential/parkland, and commercial/industrial applications at values of 0.7, 0.7, and 12 mg/kg, respectively.

No samples exceeded the CCME SQGs for all land use applications (Table B.4).

3.6 Carbon Content

Marine sediment samples JQ-39, JQ-38, JQ-90, JQ-99 and JQ-120, showed total carbon contents ranging from 1.7 to 28 grams per kilogram (g/kg). Total organic carbon (TOC) was the predominant type, ranging from 0.4 to 24 g/kg, while total inorganic carbon (TIC) ranged from 1.3 to 3.9 g/kg (Table B.5 and B.10).

Disposal soil samples JQ-01, JQ-02, JQ-03 and JQ-04, showed total carbon contents ranging from 16 to 20 grams per kilogram (g/kg). TOC was the predominant type, ranging from 9 to 18 g/kg, while TIC ranged from below laboratory detection limits to 7.3 g/kg (Table B.5 and B.10).

3.7 Grain Size Distribution

Sediment composition is described in Figures 3.1 and 3.2, and Tables 3.1 and 3.2 below. Figure 3.1 illustrates the overall substrate composition from sampling locations within the harbour expressed as percentages to show the average grain size distribution within the proposed dredge area. Table 3.1 breaks down the sediment composition at each sampling location within the harbour. Figure 3.1 illustrates the overall substrate composition from sampling locations in the historic disposal site expressed as percentages to show the average grain size distribution within the proposed dredge area. Table 3.1 breaks down the sediment composition from each quadrant of the disposal pile.

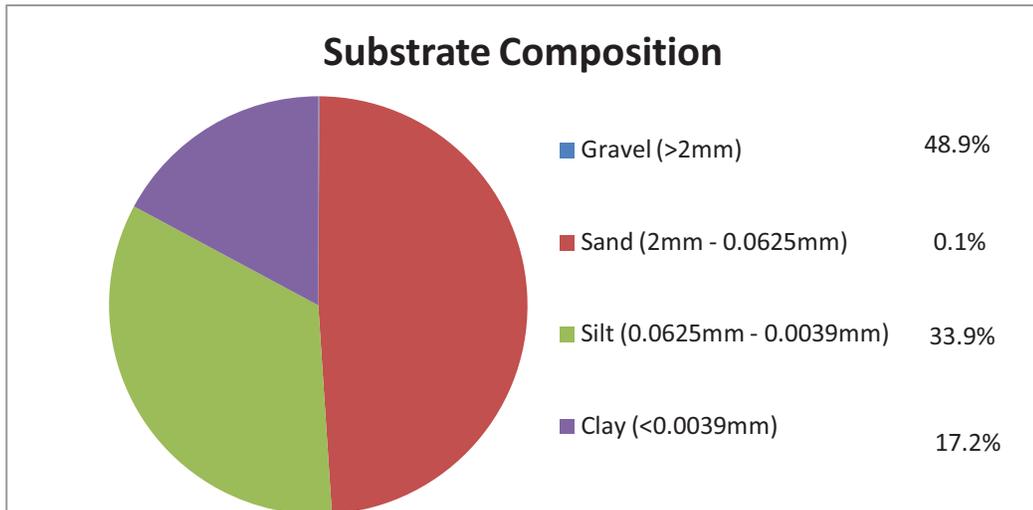


Figure 3.1: Substrate Composition Summarized from Sampling Locations within Harbour

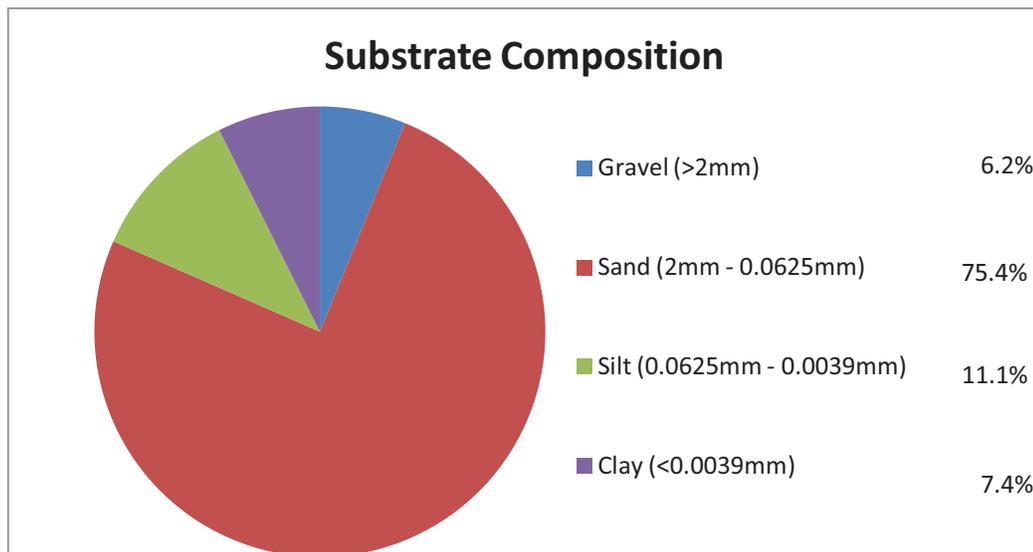


Figure 3.2: Substrate Composition Summarized from Sampling Locations within Disposal Site

Table 3.1: Dominant Sediment Types at Each Sample Location within Harbour

Sediment Distribution				
Sample ID	Primary Substrate	Secondary Substrate	Tertiary Substrate	Quaternary Substrate
JQ-39	Silt	Clay	Sand	Gravel
JQ-48	Silt	Caly	Sand	Gravel
JQ-90	Silt	Sand	Clay	Gravel
JQ-99	Sand	Silt	Clay	Gravel
JQ-120	Sand	Clay	Silt	Gravel

Table 3.2: Dominant Sediment Types at Quadrant at Disposal Site

Sediment Distribution				
Sample ID	Primary Substrate	Secondary Substrate	Tertiary Substrate	Quaternary Substrate
JQ-01	Sand	Gravel	Silt	Clay
JQ-02	Sand	Silt	Clay	Gravel
JQ-03	Sand	Silt	Clay	Gravel
JQ-04	Sand	Silt	Clay	Gravel

4.0 QUALITY ASSURANCE/QUALITY CONTROL

All samples collected were labelled on site using a waterproof marker with the date, sample site identifier, and sample number. The samples were placed upright on ice inside a cooler for safe storage and transport, and were hand-delivered to the laboratory following program completion. A copy of the Chain of Custody (COC) that accompanied the samples is provided in Appendix C. Additional samples were collected to safeguard against loss or damage during transport, and will be stored and refrigerated until the final report is received by PWGSC.

Sample collection, preparation, and analyses followed guidance provided in the afore-referenced Environment Canada document. Samples were analyzed by an accredited laboratory with CALA and/or ISO/IEC 17025 and are certified by the Standards Council of Canada (SCC) for each selected chemical analyses of this program. The complete set of analytical results, including laboratory QA/QC and Certificates of Analyses for all parameters tested, are provided in Appendix C.

The laboratory undertakes internal duplicate analyses for QA/QC purposes. Laboratory duplicate analyses were performed for total carbon, total organic carbon, grain size, metals, PAHs, leachable PAHs, BTEX, all fractions of petroleum hydrocarbons, and PCBs/DDT to meet internal QA/QC objectives for the marine sediment and historic disposal site samples submitted. No discrepancies were noted by the laboratory for the analyses performed.

To assess the quality of the analytical data, a review of the internal laboratory QA/QC results was completed and included a review of laboratory duplicate analyses, method blanks, surrogates, spike samples, and QA/QC standards. The following information applicable to this MSSP report's findings was noted:

Sediment

- OC Pesticide Analysis: Due to colour interferences, some samples required dilution. Detection limits were adjusted accordingly. Detection limits for some samples were adjusted for high moisture content.
- The recovery of the matrix spike and the spiked blank were within the acceptable laboratory QC limits.
- Detection limits were not elevated due to impacted results.

Soil

- Boron analysis for JQ-01: Elevated reporting limit due to instrument performance. Comment 2.
- Copper analysis for JQ-01: Poor RPD due to sample inhomogeneity. Comment 3.
- Elevated PAH RDL(s) due to matrix / co-extractive interference.
- Duplicate PAH analysis: results are outside acceptance limit due to possible sample inhomogeneity.
- OC Pesticide Analysis: Due to colour interferences, some samples required dilution. Detection limits were adjusted accordingly.
- The recovery of all other matrix spikes and the spiked blanks were within the acceptable laboratory QC limits.

A senior AECOM reviewer has reviewed this report prior to its release. The limitations of this document are provided in Appendix D.

5.0 CONCLUSION

The analytical results of the five (5) plus one (1) duplicate marine sediment samples collected and analyzed from the Baxter's Cove, DFO-SCH indicate JQ-39, JQ-48 and JQ-90 exceeded the CCME SQGs. The analytical results of the four (4) plus one (1) duplicate historic disposal site samples collected and analyzed indicate no exceedances.



6.0 CLOSING

This document has been prepared and reviewed by the following people:

Prepared by:

Reviewed by:

Original Signed By

Original Signed By

Kris Olson, B.Sc.
Field Technician

Jennifer Hood, B.Sc., PMP
Project Manager



**APPENDIX A
MSSP Field Report
and
Photo Log**

MSSP FIELD REPORT

Site: <u>FATEA'S Cove</u>	Location: <u>JURIQUE, NS</u>	Date: <u>31 Aug July 2012</u>
Sample Collector: <u>MATT WALLEN</u>		Time: <u>1100</u>
Recorder: <u>COLF SCARFE / KRIS OLSON</u>		Average Water Temperature (°C): <u>16</u>
Collection Device: <u>BUCKET (GRAB)</u>	Type of Vessel: <u>ZODIAC</u>	

Site Description	
Air Temperature: <u>20</u> °C <input type="checkbox"/> °F	Weather: <u>SUNNY, CALM</u>
Site Conditions: <u>WARP, EASY ACCESS, MUCH VEGETATIVE COVER IN AREAS</u>	Photographs Taken: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Observations:	

Sample ID	Sediment Description ¹	Odour ²	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude ³
<u>JQ-40</u>	<u>BLACK MUCK</u>	<u>STRONG SULFUR</u>	<u>300 CM</u>	<u>SOME FEELEGRASS, KELP ETC</u>	<u>45° 51' 27.41" S 161° 30' 14.1" W</u>
<u>JQ-39</u>	<u>BLACK MUCK</u>	<u>BLIGHT SULFUR</u>	<u>300 CM</u>	<u>" "</u>	<u>45° 51' 29.21" S 161° 30' 12.4" W</u>
<u>JQ-90</u>	<u>BLACK MUCK</u>	<u>ALONE</u>	<u>" "</u>	<u>THICK KELP, MOLT TRILFS</u>	<u>45° 51' 28.81" S 161° 30' 11.9" W</u>
<u>JQ-99</u>	<u>COARSE SAND</u>	<u>ALONE</u>	<u>" "</u>	<u>SOME FEELEGRASS, KELP ETC</u>	<u>45° 51' 28.61" S 161° 30' 15.1" W</u>
<u>JQ-120</u>	<u>COARSE SAND</u>	<u>ALONE</u>	<u>" "</u>	<u>" "</u>	<u>45° 51' 27.11" S 161° 30' 14.6" W</u>

Additional Comments

Notes:
1. Sediment colour, gradient type, sediment type, texture and consistency, colour, presence of biota
2. Degree of odour (strong, slight, none)
3. Decimal degrees (DDD.dddd)

MSSP FIELD REPORT

QUADRANT #1

Site: DREDGE PILE	Date: 31 JULY 2012
Sample Collector: KRIS OLSON (AFCON)	Time: 1335
Recorder: KRIS OLSON (AFCON)	Average Water Temperature (°C): N/A
Collection Device: SHOVEL, PAK (COMPOSITE GRAB)	Type of Vessel: N/A

Site Description	Photographs Taken: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Air Temperature: 20 °C <input type="checkbox"/> °F	Weather: SUNNY, CALM
Site Conditions: 2 km x 3 km GRID, ARE SOFT, LOOSE SAND. EASY DIGGING	
Observations: 4 QUADRANTS, 4 SUBSAMPLES (Q1-Q4) PER QUADRANT.	

Sample ID	Sediment Description ¹	Odour ²	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude ³
IQ-Q1	0-20cm BL. FINE SAND	SLIGHT PETROLEUM		NIT SIGNIFICANT BUT FEW ROOTS/LEAVES/FRUIT	45° 51' 18.1" N 161° 29' 56.2" W
IQ-Q1	20-60cm BL. FINE SAND	STRONG PETROLEUM	0-60 cm	FEW ROOTS/LEAVES/FRUIT	
IQ-Q1	0-20cm L. BL. FINE SAND	SLIGHT PETROLEUM		FEW ROOTS/LEAVES	45° 51' 18.2" N 161° 29' 55.9" W
IQ-Q1	20-60cm BL. FINE SAND	STRONG PETROLEUM	0-60 cm	TRADITIONAL (0-60 cm)	
IQ-Q1	0-20cm L. BL. FINE SAND	SLIGHT PETROLEUM		SOME ORGANICS THROUGH	45° 51' 18.3" N 161° 29' 55.6" W
IQ-Q1	20-60cm BL. FINE SAND	STRONG PETROLEUM	0-60 cm	(Q1) ROOTS, EEL FEED	
IQ-Q1	0-20cm L. BL. FINE SAND	SLIGHT PETROLEUM		FEW ORGANICS (ROOTS)	45° 51' 18.5" N 161° 29' 55.3" W
IQ-Q1	20-60cm BL. FINE SAND	SLIGHT PETROLEUM STRINGS	0-60 cm	EEL GRASS, LEAVES	

Additional Comments	
	UNLESS OTHERWISE STATED, SAND WAS DRY.
	-GPS UNIT HAS ~6m ACCURACY (LARGER THAN EACH SUBQUADRANT). WILL HEAVILY GIVE INACCURATE RESULTS.

Notes:	
	1. Sediment colour, gradient type, sediment type, texture and consistency, colour, presence of biota
	2. Degree of odour (strong, slight, none)
	3. Decimal degrees (DDDD.dddd)

MSSP FIELD REPORT

QUADRANT #2

Site: DREDGE PILE	Location: BARTER'S DIVE, TUDOR CANS	Date: 31 JULY 2012
Sample Collector: KRIS OLSON (AFCECM)		Time: 1150
Recorder: KRIS OLSON (AFCECM)		Average Water Temperature (°C): N/A
Collection Device: SHOVEL, PAUL (COMPOSITE GRAV)	Type of Vessel: N/A	

Site Description	
Air Temperature: 20°C □ °F	Weather: SUNNY, CALM
Photographs Taken: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Site Conditions: 24m x 30m GRID. HAVE SOFT, LOOSE SAND. EASY DIGGING	
Observations: 4 QUADRANTS; 4 SUBSAMPLES (Q1-Q4) PER QUADRANT.	

Sample ID	Sediment Description ¹	Odour ²	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude ³
JQ-Q1	0-20cm L.BB. FINE SAND	SLIGHT PETROLEUM		FEW ORGANICS (ROOTS, LEAVES, F.E.L.G.R.) THROUGHOUT	45° 51' 18.4" N 67° 29' 56.1" W
JQ-Q2	20-60cm BL. FINE SAND	STRONG PETROLEUM	0-60cm	SOME ORGANICS (ROOTS, SPACES, F.E.L.G.R.) THROUGHOUT	45° 51' 18.1" N 67° 29' 55.7" W
JQ-Q3	0-40cm MIST L.BB. FINE SAND	SLIGHT PETROLEUM	0-60cm	FEW (MIST) LEAVES, F.E.L.G.R.)	45° 51' 18.2" N 67° 29' 55.5" W
JQ-Q4	40-60cm BL. FINE SAND	STRONG PETROLEUM	0-60cm	FEW ORGANICS (ROOTS, LEAVES, F.E.L.G.R.)	45° 51' 18.3" N 67° 29' 55.3" W

Additional Comments
UNLESS OTHERWISE STATED, SAND WAS DRY.
GPS UNIT HAS 7km ACCURACY (LARGER THAN EACH SUBQUADRANT), WILL LIKELY LEAD TO INACCURATE RESULTS

Notes:
1. Sediment colour, gradient type, sediment type, texture and consistency, colour, presence of biota
2. Degree of odour (strong, slight, none)
3. Decimal degrees (DDD.dddd)

MSSP FIELD REPORT

QUADRANT #3

Site: DREDGE PILE Location: BAXTER'S CREEK, TULLOCH NS Date: 31 JULY 2012
 Sample Collector: KRIS OLSON (AFCEOM) Time: 1310
 Recorder: KRIS OLSON (AFCEOM) Average Water Temperature (°C): N/A
 Collection Device: SHOVEL, PAUL CHAMBERSITE GRAB Type of Vessel: N/A

Site Description

Air Temperature: 20°C °F Weather: SUNNY, CALM Photographs Taken: Yes No

Site Conditions: 20m x 20m GRID, ~~ARE~~ SOFT, LOOSE SAND, EASY DIGGING

Observations: 4 QUADRANTS, 4 SUBSAMPLES (Q1-Q4) PER QUADRANT.

Sample Data	Sample ID	Sediment Description ¹	Odour ²	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude ³
JQ-Q3, Q1	0-20cm L.B. SAND, FINE SLIGHT PETROLEUM	SLIGHT PETROLEUM		0-60cm	FINE ORGANICS (ROOTS), LEAVES, EEL GRASS	45° 51' 48.8" N 61° 29' 56.1" W
JQ-Q3, Q2	20-60cm BL. SAND, FINE STRONG PETROLEUM	STRONG PETROLEUM		0-60cm	FINE ORGANICS (ROOTS), LEAVES, EEL GRASS	45° 51' 48.8" N 61° 29' 55.7" W
JQ-Q3, Q3	0-40cm L.B. SAND, FINE SLIGHT PETROLEUM	SLIGHT PETROLEUM		0-60cm	LEAVES, EEL GRASS, THALASSIUM	45° 51' 48.1" N 61° 29' 55.1" W
JQ-Q3, Q4	40-60cm BL. SAND, FINE STRONG PETROLEUM	STRONG PETROLEUM		0-60cm	FINE ORGANICS (ROOTS), LEAVES, EEL GRASS, THALASSIUM	45° 51' 48.1" N 61° 29' 55.1" W
JQ-Q3, Q4	0-10cm L.B. SAND, FINE SLIGHT PETROLEUM	SLIGHT PETROLEUM		0-60cm	FINE ORGANICS (ROOTS), LEAVES, EEL GRASS, THALASSIUM	45° 51' 48.1" N 61° 29' 55.1" W
JQ-Q3, Q4	10-60cm L.B. SAND, FINE SLIGHT PETROLEUM	SLIGHT PETROLEUM		0-60cm	FINE ORGANICS (ROOTS), LEAVES, EEL GRASS, THALASSIUM	45° 51' 48.1" N 61° 29' 55.1" W

Additional Comments

UNLESS OTHERWISE STATED, SAND WAS DRY
 GPS UNIT HAS SOME ACCURACY (LARGER THAN SUBQUADRANTS) WILL LIKELY LEAD TO INACCURATE RESULTS.

Notes:

- Sediment colour, gradient type, sediment type, texture and consistency, colour, presence of biota
- Degree of odour (strong, slight, none)
- Decimal degrees (DDD.dddd)

MSSP FIELD REPORT

QUADRANT #4

Site: DREDGE PILE
 Location: BAXTER'S CRUE, TUDOR CANS
 Date: 31 JULY 2012
 Sample Collector: KRIS OLSON (AFCOM)
 Time: 1345
 Recorder: KRIS OLSON (AFCOM)
 Average Water Temperature (°C): N/A
 Collection Device: SHOVEL, PAUL, (IMMEDIATE GRAB)
 Type of Vessel: N/A

Site Description
 Air Temperature: 20°C □ °F □
 Weather: SUNNY, CALM
 Photographs Taken: Yes □ No
 Site Conditions: 20m x 30m GRID, HARE SOFT, LOOSE SAND, EASY DIGGING
 Observations: 4 QUADRANTS, 4 SUBSAMPLES (Q1-Q4) PER QUADRANT.

Sample ID	Sediment Description ¹	Odour ²	Grab Depth (cm)	Flora/Fauna	Latitude and Longitude ³
IQ-Q4-Q1	0-20cm L.BE. FINE SAND	SLIGHT PETROLEUM	0-10cm	FEW ORGANICS (ROOTS, LEAVES, FLECK) THROUGH	45° 51' 17.7" N 61° 29' 55.8" W
IQ-Q4-Q2	20-30cm L.BE. FINE SAND	STRONG PETROLEUM	0-10cm	FEW ORGANICS (ROOTS, LEAVES, FLECK) THROUGH	45° 51' 17.8" N 61° 29' 55.5" W
IQ-Q4-Q3	30-40cm L.BE. FINE SAND	SLIGHT PETROLEUM	0-10cm	FEW ORGANICS (ROOTS, LEAVES, FLECK) THROUGH	45° 51' 17.9" N 61° 29' 55.3" W
IQ-Q4-Q4	0-10cm L.BE. FINE SAND	SLIGHT PETROLEUM	0-10cm	FEW ORGANICS (ROOTS, LEAVES, FLECK) THROUGH	45° 51' 18.1" N 61° 29' 55.6" W
	10-40cm L.BE. FINE SAND	STRONG PETROLEUM	0-10cm	FEW ORGANICS (ROOTS, LEAVES, FLECK) THROUGH	

Additional Comments
 - UNLESS OTHERWISE STATED, SAND WAS DRY
 - GPS UNIT HAS LOW ACCURACY (LARGER THAN SUBQUADRANTS) WILL LIKELY LEAD TO INACCURATE RESULTS.

Notes:
 1. Sediment colour, gradient type, sediment type, texture and consistency, colour, presence of biota
 2. Degree of odour (strong, slight, none)
 3. Decimal degrees (DDD.dddd)



Photo 1: Northern Section of Harbour, Face Northeast



Photo 2: Central Section of Harbour – JQ-39, JQ-48, Face East



Photo 3: Central Section of Harbour – JQ-90, JQ-99, JQ-120, Face Southeast



Photo 4: Overview of Historic Disposal Site



Photo 5: JQ-01 Quadrant of Disposal Site Farthest North, Face East



Photo 6: JQ-02 Quadrant of Disposal Site, Face East



Photo 7: JQ-03 Quadrant of Disposal Site, Face East



Photo 8: JQ-04 Quadrant of Disposal Site, Face East



Photo 9: Typical Hole in Disposal Site – Dark Brown Sand 0-20 cm BGS, Black Sand 20-60 cm BGS



APPENDIX B
Analytical Summary Tables

Table B.1. PAH Results for Marine Sediments - Baxter's Cove DFO-SCH, Inverness County, Nova Scotia

Parameter	RDL	Sample Identification and Date					CCME Sediment Quality Guidelines ²				CCME Soil Quality Guidelines ³									
		July 31, 2012					Marine and Estuarine Probable Effects Levels		Human Health		Environmental Health		Freshwater, Life		Interim Soil Quality Criteria					
		CEPA Disposal at Sea Guidelines ¹					Interim Sediment Quality Guidelines	Potable Water	Direct Contact	Soil Contact		Soil and Food Ingestion		Agricultural, Residential, Parkland, Commercial and Industrial		Agricultural Uses	Residential/ Parkland Land Uses	Commercial/ Industrial Land Uses		
		JQ-39 -SED- 2012-07-31-1	JQ-48 -SED- 2012-07-31-1	JQ-90 -SED- 2012-07-31-1	JQ-99 -SED- 2012-07-31-1	JQ-120 -SED- 2012-07-31-1				Agricultural, Residential, Commercial and Industrial Land Uses	Agricultural, Residential, Parkland, Commercial and Industrial Land Uses	Agricultural, Residential, Parkland, Commercial and Industrial Land Uses	Agricultural, Residential, Parkland, Commercial and Industrial Land Uses	Agricultural, Residential, Parkland, Commercial and Industrial Land Uses	Agricultural, Residential, Parkland, Commercial and Industrial Land Uses				Agricultural, Residential, Parkland, Commercial and Industrial Land Uses	
Polycyclic Aromatic Hydrocarbon (PAH) Results																				
1-Methylanthracene	0.0050	<0.005	<0.005	0.013	<0.005	<0.005														
2-Methylanthracene	0.0050	<0.005	0.013	0.016	<0.005	<0.005	0.201													
Acenaphthene	0.0050	<0.005	0.018	0.044	<0.005	<0.005	0.0889								21.5				0.28	
Anthracene	0.0050	<0.005	<0.005	<0.005	<0.005	<0.005	0.128								3.20					
Benzo(a)anthracene	0.0050	0.05	0.021	0.047	<0.005	<0.005	0.0469								61.5				0.1	
Benzo(b)fluoranthene	0.0050	0.021	0.079	0.068	<0.005	<0.005	0.0748								20				8600	
Benzo(k)fluoranthene	0.0050	0.031	0.053	0.06	<0.005	<0.005													0.1	
Benzo(a)pyrene	0.0050	0.019	0.027	0.032	<0.005	<0.005													0.1	
Benzo(b)perylene	0.0050	0.019	0.027	0.032	<0.005	<0.005													0.1	
Benzo(g)perylene	0.0050	0.019	0.027	0.032	<0.005	<0.005													0.1	
Chrysene	0.0050	0.071	0.1	0.13	<0.005	<0.005	0.846								6.2				0.1	
Dibenz(a,h)anthracene	0.0050	<0.005	<0.005	<0.005	<0.005	<0.005	0.135								6.2				0.1	
Fluoranthene	0.0050	0.13	0.25	0.29	0.0098	<0.005	0.113								50				1	
Fluorene	0.0050	<0.005	0.027	0.047	<0.005	<0.005	0.0512								180				15.4	
Indeno(1,2,3-cd)pyrene	0.0050	0.013	0.02	0.025	<0.005	<0.005													0.25	
Benzo(a)fluoranthene	0.0050	0.013	0.02	0.025	<0.005	<0.005													0.1	
Benzo(a)pyrene	0.0050	0.019	0.027	0.032	<0.005	<0.005	0.391												8.8	
Phenanthrene	0.0050	0.05	0.083	0.076	0.009	<0.005	0.0867												0.713	
Pyrene	0.0050	0.08	0.14	0.18	0.0068	<0.005	0.544								43				0.046	
Total PAH		0.52	0.92	1.14	0.06	0.0068	1.398								7.7				0.1	
Index of Additive Cancer Risk (IACR)		0.64	1.05	1.42	0.07	<0.005														100
Benzo(a)pyrene TPE (10 ⁻⁵)		0.04	0.06	0.08	0.01	<0.005														
Creosote or Coal Tar source suspected/known?		Not able to confirm*	Not able to confirm*	No	No	No														5.3
Uncertainty Factor Applied with UF																				

Notes:
 * indicates laboratory's reportable detection limit, ND = not detected above RDL
 - indicates no guideline available
 1. ODOCA National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)
 2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)
 3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)
 4. Lab unable to confirm the presence of creosote. Samples have chromatographic peaks present that are consistent with peaks observed in creosote reference materials. The source of the peaks cannot be determined based on the chromatographic information.
 Underline = indicates exceedance
 Italic = indicates CCME Sediment Quality Guidelines Exceedance
 Bold = indicates CCME Sediment Quality Guidelines for Protection of Environmental Health Criteria Exceedance
 CCME = Canadian Council of Ministers of the Environment
 Heavy Underline = indicates CCME Interim Soil Quality Criteria Exceedance
 Hatched = indicates CCME Soil Quality Guideline for Protection of Human Health Criteria Exceedance

Table B.1.b. PAH Results for the Leachate Samples- Baxter's Cove DFO-SCH , Inverness County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life ¹		Health Canada Canadian Guideline for Drinking Water Quality ²	
			JQ-48 -SED-2012-07-31-1	JQ-90 -SED-2012-07-31-1	Freshwater	Marine	Maximum Acceptable Concentration	Aesthetic Objective
			31-Jul-12					
Leachable Polycyclic Aromatic Hydrocarbons (PAHs)								
1-Methylnaphthalene	0.01		< 0.01	0.019	-	-	-	-
2-Methylnaphthalene	0.01		0.012	0.016	5.8	-	-	-
Acenaphthylene	0.005		0.046	0.17	-	-	-	-
Acenaphthene	0.005		< 0.005	< 0.005	0.012	-	-	-
Anthracene	0.005		0.015	0.028	0.018	-	-	-
Benzo(a)anthracene	0.005		< 0.005	< 0.005	0.015	-	-	-
Benzo(a)pyrene	0.005		< 0.005	< 0.005	-	-	0.01	-
Benzo(b)fluoranthene	0.005		< 0.005	< 0.005	-	-	-	-
Benzo(g,h,i)perylene	0.005		< 0.005	< 0.005	-	-	-	-
Benzo(j)fluoranthene	0.005		< 0.005	< 0.005	-	-	-	-
Benzo(k)fluoranthene	0.005		< 0.005	< 0.005	-	-	-	-
Chrysene	0.005		< 0.005	0.0052	-	-	-	-
Dibenz(a,h)anthracene	0.005		< 0.005	< 0.005	0.04	-	-	-
Fluoranthene	0.005		0.056	0.095	3	-	-	-
Fluorene	0.005		0.046	0.096	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.005		< 0.005	< 0.005	1.1	-	-	-
Naphthalene	0.02		0.024	0.054	-	1.4	-	-
Perylene	0.005		< 0.005	< 0.005	0.4	-	-	-
Phenanthrene	0.005		0.065	0.059	0.025	-	-	-
Pyrene	0.005		0.034	0.054	3.4	-	-	-
IACR			ND	ND				

Notes:

RDL = laboratory's reportable detection limit

'-' = no guideline available

Underline = indicates exceedance

Bold - indicates results that exceed CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life

1 - CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (2011)

2. Health Canada Canadian Guideline for Drinking Water Quality (2012)

Table B.2. Metal Concentrations for Marine Sediments - Baxter's Cove DFO-SCH , Inverness County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Guidelines ¹	CCME Sediment Quality Guidelines ²			CCME Soil Quality Guidelines ³		
			July 31, 2012							Interim Sediment Quality Guidelines	Marine and Estuarine Probable Effects Levels	Agricultural	Residential/ Parkland	Commercial/ Industrial	
			JQ-39 -SED- 2012-07-31-1	JQ-39 -SED- 2012-07-31-1 DJP	JQ-48 -SED- 2012-07-31-1	JQ-90 -SED- 2012-07-31-1	JQ-99 -SED- 2012-07-31-1	JQ-120 -SED- 2012-07-31-1							
Antimony	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	-	20	20	20	40		
Arsenic	2.0		5.8	6.4	6	5.7	2.1	< 2.0	7.24	12	12	12	12		
Barium	5.0		110	140	130	100	48	< 2.0	67	750	500	2000	2000		
Beryllium	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	4	4	8	8		
Cadmium	0.3		0.53	0.43	0.52	0.46	< 0.3	< 0.3	0.6	0.7	1.4	10	22		
Chromium +6	0.2		< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	-	0.4	0.4	1.4	1.4		
Chromium (Total)	2.0		19	22	21	19	5.7	3.7	52.3	64	64	64	87		
Cobalt	1.0		9.9	11	11	9.4	3.4	2.2	-	40	50	300	300		
Copper	2.0		22	27	25	25	5.4	108	18.7	63	63	91	91		
Lead	0.5		19	21	20	18	5.3	3.4	66	70	140	260 / 600	260 / 600		
Mercury	0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.75	0.13	6.6	6.6	24 / 50		
Molybdenum	2.0		4.6	4.4	3.8	4.4	< 2.0	< 2.0	-	5	10	40	40		
Nickel	2.0		22	24	25	21	6	3.4	-	50	50	50	50		
Selenium	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	1	1	1	2.9		
Silver	0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	20	20	40	40		
Thallium	0.1		0.22	0.2	0.19	0.18	< 0.1	< 0.1	-	1	1	1	1		
Tin	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	5	5	50	300		
Uranium	0.1		1.4	1.5	1.3	1.3	0.66	0.26	-	23	23	33 / 300	33 / 300		
Vanadium	2.0		26	28	27	25	10	9.1	-	130	130	130	130		
Zinc	5.0		74	83	82	74	25	16	160	200	200	360	360		

Notes:

RDL = laboratory's reportable detection limit. ND = not detected above RDL

-, - = no guideline available

1. ODCA National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)

2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)

3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)

Underline = indicates exceedance

Italic = indicates CCME Sediment Quality Guidelines Exceedance

Table B.3. BTEX/TPH Concentrations for Marine Sediments- (Harbour) DFO-SCH , (County), (Province)

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Resemblance	
			Benzene	Toluene	Ethylbenzene	Xylenes	C6 - C10 (Less BTEX)	>C10 - C16	>C16 - C21	>C21 - <C32	C16 - <C32	Modified TPH (Less BTEX)		
JQ-39-SED-2012-07-31-1	July 31, 2012	mg/kg	< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	25	38	63	62	Lube oil fraction	
JQ-39-SED-2012-07-31-1-DUP			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	31	48	63	111	140	140	Lube oil fraction
JQ-48-SED-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	41	88	129	130	130	Lube oil fraction
JQ-90-SED-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	39	58	97	97	97	Lube oil fraction
JQ-99-SED-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	< 15	< 15	< 15	< 15	Not applicable
JQ-120-SED-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	< 15	< 15	< 15	< 15	Not applicable
RDL			0.005	0.025	0.01	0.05	2.5	10	15	15	15	15		
Reached Baseline at C32			Yes, where applicable											
Atlantic RECA Tier I RBSLs for Soil¹														
Residential	Potable	Coarse-grained	0.03	0.38	0.08	11	-	-	-	-	-	690		
		Fine-grained	0.01	0.08	0.02	2.3	-	-	-	-	-	970		
	Non-potable	Coarse-grained	0.16	14	58	17	-	-	-	-	-	690		
Commercial		Fine-grained	1.5	120	430	160	-	-	-	-	-	8300		
	Potable	Coarse-grained	0.03	0.38	0.08	11	-	-	-	-	-	10000		
		Fine-grained	0.01	0.08	0.02	2.3	-	-	-	-	-	4700		
	Non-potable	Coarse-grained	1.8	160	430	200	-	-	-	-	-	10000		
	Fine-grained	11	680	430	650	-	-	-	-	-	10000			
CCME Soil Quality Guidelines²														
Agricultural Land Use	Surface	Coarse Soil	0.03 ³ (0.0095) ⁴	0.37	0.082	11	30 b	150	-	-	300	-		
		Fine Soil	0.0068 ^{3,a}	0.08	0.018	2.4	210 (170a)	150	-	-	1300	-		
	Subsoil	Coarse Soil	-	-	-	-	-	-	-	-	-	-		
Residential/ Parkland Use		Fine Soil	-	-	-	-	-	-	-	-	-	-		
	Surface	Coarse Soil	0.03 ³ (0.0095) ⁴	0.37	0.082	11	30 b	150	-	-	300	-		
		Fine Soil	0.0068 ^{3,a}	0.08	0.018	2.4	210 (170a)	150	-	-	1300	-		
	Subsoil	Coarse Soil	-	-	-	-	-	-	-	-	-	-		
Commercial/ Industrial Land Use		Fine Soil	-	-	-	-	-	-	-	-	-	-		
	Surface	Coarse Soil	0.03 ^{3,4}	0.37	0.082	11	320 (240 a)	260	-	-	1700	-		
		Fine Soil	0.0068 ^{3,a}	0.08	0.018	2.4	320 (170 a)	260 (230 a)	-	-	2500	-		
	Subsoil	Coarse Soil	-	-	-	-	-	-	-	-	-	-		
		Fine Soil	-	-	-	-	-	-	-	-	-	-		

Notes:

'-' = No applicable guideline available

RDL = Reportable detection limit

1 - Atlantic RECA Version 2 Reference Document for Petroleum Impacted Sites

2 - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Update 7.0

Table B.4. PCB and DDT Analytical Results for Marine Sediments- Baxter's Cove DFO-SCH , Inverness County, Nova Scotia

Parameter	RDL ⁴	Units	Sample Identification and Date					CEPA Disposal at Sea Guidelines ¹	CCME Sediment Quality Guidelines ²			CCME Soil Quality Guidelines ³		
			July 31, 2012						Interim Sediment Quality Guidelines	Marine and Estuarine Probable Effects Levels	Agricultural	Residential/ Parkland	Commercial/ Industrial	
			JQ-39 -SED-2012-07-31-1	JQ-48 -SED-2012-07-31-1	JQ-90 -SED-2012-07-31-1	JQ-99 -SED-2012-07-31-1	JQ-120 -SED-2012-07-31-1							
Polychlorinated Biphenyl (PCB) Results														
Aroclor 1016			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1221			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1232			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1242			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1248			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254		mg/kg	-	-	-	-	-	-	-	0.0633	-	0.709	-	-
Aroclor 1260			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1262			-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1268			-	-	-	-	-	-	-	-	-	-	-	-
Total PCB Concentration	0.1		0.034	0.027	0.037	0.017	0.017	ND	100	0.0215	-	0.189	0.5	1.3
Dichloro-Diphenyl-Trichloroethane (DDT) Results														
o,p-DDE			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	0.0027	-	0.374	-	-
p,p-DDE			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	0.0027	-	0.374	-	-
o,p-DDD			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	0.00122	-	0.00781	-	-
p,p-DDD			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	0.00122	-	0.00781	-	-
o,p-DDT			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	-	-	-	-	-
p,p-DDT		mg/kg	< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	-	-	-	-	-
o,p-DDT + p,p-DDT	0.000006		< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	-	-	-	-	-
o,p-DDD + p,p-DDD			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	-	-	-	-	-
o,p-DDD + p,p-DDE			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	-	-	-	-	-
Total DDT (calculated)			< 0.00003	< 0.000006	< 0.000006	< 0.00001	< 0.000002	< 0.000002	-	0.0019	-	0.00477	0.7	0.7
														12

Notes:

RDL = laboratory's reportable detection limit

'-' = no guideline available

1. ODC National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)

2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)

3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)

. RDL for pesticides for JQ-39 = 0.00003, JQ-99 = 0.00001, JQ-120=0.000002 (mg/kg)

Table B.5. TIC, TOC and Grain Size Analytical Results for Marine Sediments- Baxter's Cove DFO-SCH , Inverness County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date				
			JQ-39 -SED- 2012-07-31- 1	JQ-39 -SED- 2012-07-31- 1-DUP	JQ-48 -SED- 2012-07-31- 1	JQ-90 -SED- 2012-07-31- 1	JQ-99 -SED- 2012-07-31- 1
Grain Size Results							
< PHI -4 (16 mm)	0.10		100	NA	100	100	100
< PHI -3 (8 mm)	0.10		100	NA	100	100	100
< PHI -2 (4 mm)	0.10		100	NA	100	100	100
< PHI -1 (2 mm)	0.10		100	NA	100	100	100
< PHI 0 (1/2 mm)	0.10		98	NA	99	99	99
< PHI +1 (1/4 mm)	0.10		97	NA	98	99	98
< PHI +2 (1/8 mm)	0.10		96	NA	97	92	85
< PHI +3 (1/16 mm)	0.10		93	NA	95	78	29
< PHI +4 (1/32 mm)	0.10		85	NA	89	67	11
< PHI +5 (1/32 mm)	0.10		72	NA	78	54	7.7
< PHI +6 (1/64 mm)	0.10		52	NA	56	42	6.1
< PHI +7 (1/128 mm)	0.10		33	NA	35	29	4.9
< PHI +8 (1/256 mm)	0.10		27	NA	28	24	4.5
< PHI +9 (1/512 mm)	0.10		21	NA	21	19	4.3
Gravel	0.10		< 0.1	NA	< 0.1	< 0.1	< 0.1
Sand	0.10		15	NA	11	33	89
Silt	0.10		58	NA	62	43	6.5
Clay	0.10		27	NA	28	24	4.5
Other							
Total Organic Carbon (TOC)	0.2, 0.3, 0.4	g/kg	28	NA	28	27	7.9
Total Inorganic Carbon (TIC)	0.2, 0.5	g/kg	3	NA	3.8	3.9	3
Total Carbon (TC)	0.2, 0.5	g/kg	28	NA	28	27	7.9
Moisture	1	%	53	58	58	55	25

Notes:
 NA = Not Analyzed
 RDL = laboratory's reportable detection limit
 '-' = Parameter not analyzed
 * PSA: Fraction PHI -1 contained one large rock.

Table B.6. PAH Results for Soil - Baxter's Cove DFO-SCH, Inverness County, Nova Scotia

Parameter	RDL	Sample Identification and Date				CEPA Disposal at Sea Guidelines ¹	CCME Sediment Quality Guidelines ²		CCME Soil Quality Guidelines ³							
		JQ-01 -SL- 2012-07-31-1		JQ-03 -SL- 2012-07-31-1			JQ-04 -SL- 2012-07-31-1		Human Health		Environmental Health		Interim Soil Quality Criteria			
		Units	July 31, 2012	July 31, 2012	July 31, 2012		July 31, 2012	Potable Water	Direct Contact	Soil Contact	Soil and Food Ingestion	Freshwater Life	Agricultural Use	Residential/ Parkland Land Uses	Commercial/ Industrial Land Uses	
Polycyclic Aromatic Hydrocarbon (PAH) Results																
1. Methylchlothalene	0.0050	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-	-	
2. Methylindanthrene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.202	-	-	-	-	-	-	-	-	
3. Acenaphthylene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.0571	-	21.5	0.28	-	-	-	-	-	
4. Anthracene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.0587	-	-	320	-	-	-	-	-	
5. Benz(a)anthracene	0.0050	0.0078	<0.005	<0.005	<0.005	-	0.0469	2.5	61.5	-	-	-	-	-	-	
6. Benz(a)pyrene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.0748	-	6.2	8800	0.1	1	10	10	10	
7. Benz(b)fluoranthene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.0888	-	20	0.6	0.1	1	10	10	10	
8. Benz(g,h)perylene	0.0050	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-	-	
9. Benz(k)fluoranthene	0.0050	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	-	-	
10. Dibenzo(a,h)anthracene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.108	-	6.2	-	0.1	1	10	10	10	
11. Fluorene	0.0050	0.022	0.019	0.018	0.015	-	0.0322	1.484	15.4	-	-	-	-	-	-	
12. Indeno(1,2,3-cd)pyrene	0.0050	<0.005	<0.005	<0.005	<0.005	-	0.0212	50	180	-	-	-	-	-	-	
13. Naphthalene	0.0050	<0.005	0.0076	<0.005	<0.005	-	0.0346	-	-	-	-	-	-	-	-	
14. Phenylene	0.0050	0.016	0.016	0.015	0.016	-	-	-	-	-	-	-	-	-	-	
15. Pyrene	0.0050	0.015	0.013	0.014	0.011	-	0.0987	-	43	-	-	-	-	-	-	
16. Risk of Ad. Cancer	0.0050	0.014	0.012	0.013	0.011	-	0.153	-	7.7	-	-	-	-	-	-	
17. Risk of Additive Cancer	0.0050	0.11	0.09	0.08	0.07	-	-	-	-	-	-	-	-	-	-	
18. Risk (IACR)	0.0050	0.10	0.07	0.07	0.07	-	-	-	-	-	-	-	-	-	-	
19. Benzo(a)pyrene TPE (10 ⁻⁵)	0.0050	0.01	0.01	0.01	0.01	-	-	-	-	5.3	-	-	-	-	-	
20. Creosote or Coal Tar source suspected/known?	0.0050	No	No	No	No	§	-	-	-	-	-	-	-	-	-	
21. Uncertainty Factor Applied	0.0050															
22. Benzo(a)pyrene TPE (10 ⁻⁵) with UF	0.0050															

Notes:
 * - Indicates a probable detection limit; ND = not detected above RDL
 * - * - no guideline available

1. OCA National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)
 2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)
 3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)
 * - Elevated PAH RDL(s) due to matrix / co-extractive interference.

Table B.7. Metal Concentrations for Soil - Baxter's Cove DFO-SCH , Inverness County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Guidelines ¹	CCME Sediment Quality Guidelines ²			CCME Soil Quality Guidelines ³		
			JQ-01 -SL- 2012-07-31-1		JQ-02 -SL- 2012-07-31-1		JQ-03 -SL- 2012-07-31-1			Interim Sediment Quality Guidelines	Marine and Estuarine Probable Effects Levels	Agricultural	Residential/ Parkland	Commercial/ Industrial	
			DUP	July 31, 2012	DUP	July 31, 2012	DUP	July 31, 2012							
Antimony	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	-	20	20		
Arsenic	2.0		4.3	3.3	4.1	3.7	3.1	-	7.24	41.6	12	12	12		
Barium	5.0		50	37	61	46	36	-	-	-	750	500	500		
Beryllium	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	4	4	4		
Cadmium	0.30		0.31	<0.3	0.34	0.35	<0.3	0.6	0.6	4.2	1.4	1.4	10		
Chromium +6	0.20		<0.2	-	<0.2	<0.2	<0.2	-	-	-	0.4	0.4	0.4		
Chromium (Total)	2.0		8.1	6.7	7.9	7.1	5	-	52.3	160	64	64	64		
Cobalt	1.0		4.7	3.6	4.4	4	3.1	-	-	-	40	40	50		
Copper	2.0		8.3	6.2	8.1	7.1	5	81	18.7	108	63	63	63		
Lead	0.50		7.2	5.9	7.7	6.3	5.3	66	30.2	112	70	70	140		
Mercury	0.10		<0.1	<0.1	<0.1	<0.1	<0.1	0.75	0.13	0.7	6.6	6.6	6.6		
Molybdenum	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	5	5	10		
Nickel	2.0		10	8.5	11	9.4	6.6	-	-	-	50	50	50		
Selenium	1.0		<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	1	1	1		
Silver	0.50		<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	20	20	20		
Thallium	0.10		<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	1	1	1		
Tin	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	5	5	50		
Uranium	0.10		0.66	0.48	0.69	0.64	0.45	-	-	-	23	23	23		
Vanadium	2.0		12	11	12	11	8.9	-	-	-	130	130	130		
Zinc	5.0		33	30	35	32	24	160	124	271	200	200	200		

Notes:

RDL = laboratory's reportable detection limit

-, 'J' = no guideline available

1. ODCA National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)

2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)

3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)

Table B.8. BTEX/TPH Concentrations for Soil- Baxter's Cove DFO-SCH, Inverness County, Nova Scotia

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Resemblance
			Benzene	Toluene	Ethylbenzene	Xylenes	C6 - C10 (Less BTEX)	>C10 - C16	>C16 - C21	>C21 - <C32	C16 - <C32	Modified TPH (Less BTEX)	
JQ-01-SL-2012-07-31-1	July 31, 2012	mg/kg	< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	26	26	26	Lube oil fraction
JQ-02-SL-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	26	26	26	Lube oil fraction
JQ-03-SL-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	23	23	23	Lube oil fraction
JQ-04-SL-2012-07-31-1			< 0.005	< 0.025	< 0.01	< 0.05	< 2.5	< 10	< 10	26	26	26	Lube oil fraction
RDL			0.005	0.025	0.01	0.05	2.5	10	15	15	15	Lube oil fraction	
Reached Baseline at C32			Yes										
Atlantic RBCA Tier I RBSLs for Soil¹													
Residential	Potable		0.03	0.38	0.08	11	-	-	-	-	-	690	
	Fine-grained		0.01	0.08	0.02	2.3	-	-	-	-	-	970	
Non-potable	Coarse-grained		1.6	14	58	17	-	-	-	-	-	690	
	Fine-grained		1.5	120	430	160	-	-	-	-	-	8300	
Commercial	Potable		0.03	0.38	0.08	11	-	-	-	-	-	10000	
	Fine-grained		0.01	0.08	0.02	2.3	-	-	-	-	-	4700	
Non-potable	Coarse-grained		1.8	160	430	200	-	-	-	-	-	10000	
	Fine-grained		11	680	430	650	-	-	-	-	-	10000	
CCME Soil Quality Guidelines²													
Agricultural Land Use	Surface		0.03 ³ (0.0095) ⁴	0.37	0.082	11	30 b	150	-	-	300	-	-
	Fine Soil		0.0068 ^{3,a}	0.08	0.018	2.4	210 (170a)	150	-	-	1300	-	-
	Coarse Soil		-	-	-	-	-	-	-	-	-	-	-
Residential/ Parkland Use	Surface		0.03 ³ (0.0095) ⁴	0.37	0.082	11	30 b	150	-	-	300	-	-
	Fine Soil		0.0068 ^{3,a}	0.08	0.018	2.4	210 (170a)	150	-	-	1300	-	-
	Coarse Soil		-	-	-	-	-	-	-	-	-	-	-
Commercial/ Industrial Land Use	Surface		0.03 ^{3,a}	0.37	0.082	11	320 (240 a)	260	-	-	1700	-	-
	Fine Soil		0.0068 ^{3,a}	0.08	0.018	2.4	320 (170 a)	260 (230 a)	-	-	2500	-	-
	Coarse Soil		-	-	-	-	-	-	-	-	-	-	-
	Subsoil		-	-	-	-	-	-	-	-	-	-	-

1 - Atlantic RBCA Version 2 Reference Document for Petroleum Impacted Sites
 2 - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Update 7.0
 3 - Guideline based on a 10⁻⁶ Incremental Risk – Surface (≤1.5m)
 4 - Guideline based on a 10⁻⁶ Incremental Risk – Surface (≤1.5m)
 a - for the protection of potable water where applicable

Table B.9. PCB and DDT Analytical Results for Soil- Baxter's Cove DFO-SCH, Inverness County, Nova Scotia

Parameter	RDL ⁴	Units	Sample Identification and Date				CEPA Disposal at Sea Guidelines ¹	CCME Sediment Quality Guidelines ²		CCME Soil Quality Guidelines ³		
			July 31, 2012					Interim Sediment Quality Guidelines	Marine and Estuarine Probable Effects Levels	Agricultural	Residential/ Parkland	Commercial/ Industrial
			JQ-01 -SL- 2012-07-31-1	JQ-02 -SL- 2012-07-31-1	JQ-03 -SL- 2012-07-31-1	JQ-04 -SL- 2012-07-31-1						
Polychlorinated Biphenyl (PCB) Results												
Aroclor 1016			-	-	-	-	-	-	-	-	-	-
Aroclor 1221			-	-	-	-	-	-	-	-	-	-
Aroclor 1232			-	-	-	-	-	-	-	-	-	-
Aroclor 1242			-	-	-	-	-	-	-	-	-	-
Aroclor 1248			-	-	-	-	-	-	-	-	-	-
Aroclor 1254			-	-	-	-	0.0633	0.709	-	-	-	-
Aroclor 1260			-	-	-	-	-	-	-	-	-	-
Aroclor 1262			-	-	-	-	-	-	-	-	-	-
Aroclor 1268			-	-	-	-	-	-	-	-	-	-
Total PCB Concentration ⁵	0.01		0.018	0.017	0.014	0.014	0.0215	0.189	0.5	1.3	33	
Dichloro-Diphenyl-Trichloroethane (DDT) Results												
o,p-DDE	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	< 0.0027	0.374	-	-	-	
p,p-DDE	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	0.0027	0.374	-	-	-	
o,p-DDD	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	0.00122	0.00781	-	-	-	
p,p-DDD	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	0.00122	0.00781	-	-	-	
o,p-DDT	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	-	-	-	-	-	
p,p-DDT	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	-	-	-	-	-	
o,p-DDT + p,p-DDT	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	-	-	-	-	-	
o,p-DDD + p,p-DDD	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	-	-	-	-	-	
o,p-DDE + p,p-DDE	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	-	-	-	-	-	
Total DDT (calculated)	0.000001		< 0.000002	< 0.000001	< 0.000001	< 0.000001	0.0019	0.00477	0.7	0.7	12	

Notes:

RDL = laboratory's reportable detection limit

*,† = no guideline available

1. ODCA National Guidelines for Monitoring Dredged and Excavated Material at Ocean Disposal Sites (1998)

2. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) for CCME Sediment Quality Guidelines for the Protection of Aquatic Life (1999)

3. CCME Metal Soil Quality Guidelines for the Protection of Environmental and Human Health (revised 2010)

4. RDL for pesticides for JQ-01 was 0.000002 mg/kg

5. Detected as Aroclor 1260

Table B.10. TIC, TOC and Grain Size Analytical Results for Soil- Baxter's Cove DFO-SCH, Inverness County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date			
			JQ-01 -SL- 2012-07-31-1	JQ-02 -SL- 2012-07-31-1	JQ-03 -SL- 2012-07-31-1	JQ-04 -SL- 2012-07-31-1
Grain Size Results						
< PHI -4 (16 mm)	0.10		100	100	100	100
< PHI -3 (8 mm)	0.10		100	100	100	100
< PHI -2 (4 mm)	0.10		100	100	100	100
< PHI -1 (2 mm)	0.10		84*	96	99	97
< PHI 0 (1/2 mm)	0.10		82	94	97	95
< PHI +1 (1/4 mm)	0.10		80	93	95	94
< PHI +2 (1/8 mm)	0.10		54	63	63	63
< PHI +3 (1/16 mm)	0.10		27	29	25	21
< PHI +4 (1/32 mm)	0.10		20	22	18	14
< PHI +5 (1/32 mm)	0.10		17	18	15	12
< PHI +6 (1/64 mm)	0.10		12	14	12	9.4
< PHI +7 (1/128 mm)	0.10		8.4	9.8	8.5	7.3
< PHI +8 (1/256 mm)	0.10		7.4	8.5	7.2	6.4
< PHI +9 (1/512 mm)	0.10		5.9	6.3	5.7	5
Gravel	0.10		16	4	1.4	3.3
Sand	0.10		64	74	81	83
Silt	0.10		13	13	11	7.3
Clay	0.10		7.4	8.5	7.2	6.4
Other						
Total Organic Carbon (TOC)	0.2, 0.3, 0.4	g/kg	18	14	12	9.0
Total Inorganic Carbon (TIC)	0.2, 0.5	g/kg	ND	5.8	7.3	6.8
Total Carbon (TC)	0.2, 0.5	g/kg	18	20	20	16
Moisture	1	%	28	29	22	26

* PSA: Fraction PHI -1 contained one large rock.



20 January, 2015

TV151205 (Phase JUDHBR)

Mr. Troy Young, B.Sc.
Environmental Specialist
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Re: Analytical Results Comparison to Nova Scotia Environmental Quality Standards for Sediment Samples Collected at Judique (Baxter's Cove) Fisheries and Oceans Canada – Small Craft Harbour, Inverness County, Nova Scotia

Dear Mr. Young:

AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC) is pleased to provide the results of analytical marine sediment sample results collected from the Judique (Baxter's Cove) Fisheries and Oceans Canada (DFO) – Small Craft Harbour (SCH) in Inverness County, Nova Scotia (NS) compared against the NS Environmental Quality Standards (EQS) as per your request on 7 January, 2015. Analytical results of samples collected by AECOM under a separate Public Works and Government Services (PWGSC) contract on 31 July, 2012 were used for the purposes of this guideline comparison exercise.

ANALYTICAL RESULTS COMPARED TO NS EQS SUMMARY

The analytical results of the marine sediment samples collected and analyzed from the Judique (Baxter's Cove) DFO-SCH as compared against NS EQS are summarized in Tables A.1 to A.5 (Attachment A) and discussed below. The analytical results of the soil samples collected and analyzed from this property location as compared against the NS EQS are summarized in Tables B.1 to B.4 (Attachment B) and are also discussed below.

SEDIMENT SAMPLES

Polycyclic Aromatic Hydrocarbons (PAHs)

- **Sediment Environments**

Two leachate samples (JQ-48-SED-2012-07-31-1 and JQ-90-SED-2012-07-31-1) exceeded the NS EQS for Surface Water (Freshwater) for three individual PAH compounds (anthracene, fluoranthene, and pyrene). The NS EQS for Surface Water (Marine) was also exceeded for pyrene in these two samples (Table A.2).

Metals

• **Land-Based Sites**

Four samples (JQ-39-SED-2012-07-31-1 and its duplicate JQ-39-SED-2012-07-31-1-DUP, JQ-48-SED-2012-07-31-1, and JQ-90-SED-2012-07-31-1) exceeded the NS EQS for agricultural, residential/parkland, and commercial land use applications for iron (Table A.3).

Petroleum Hydrocarbons

• **Sediment Environment**

Four samples (JQ-39-SED-2012-07-31-1 and its duplicate JQ-39-SED-2012-07-31-1-DUP, JQ-48-SED-2012-07-31-1, and JQ-90-SED-2012-07-31-1) exceeded the NS EQS (Freshwater and Marine) with modified total petroleum hydrocarbon concentrations (less benzene, toluene, ethylbenzene, and xylene) above 43 mg/kg (Table A.4).

Dichloro-Diphenyl-Trichloroethane (DDT)

• **Sediment Environments**

The laboratory detection limits for total dichloro-diphenyl-trichloroethane (DDT) of 0.0060 to 0.030 mg/kg exceeded the NS EQS for Sediment Environments (Freshwater and Marine) of 0.00477 mg/kg, therefore comparison against this guideline is not possible (Table A.5).

SOIL SAMPLES

Dichloro-Diphenyl-Trichloroethane (DDT)

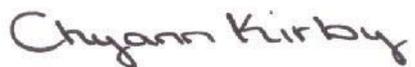
• **Sediment Environments**

The laboratory detection limits for total DDT of 0.010 mg/kg exceeded the NS EQS for Sediment Environments (Freshwater and Marine) of 0.00477 mg/kg, therefore comparison against this guideline is not possible (Table B.4).

CLOSING

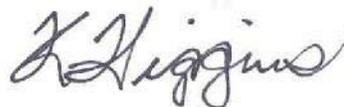
We trust that the information contained in this letter meets your requirements. Please do not hesitate to contact us, if you have any questions regarding the above.

Prepared by:



Chyann Kirby, B.Sc., EP, PTech
Project Manager /
Intermediate Project Professional

Reviewed by:



Kerry Higgins, B.Sc., EP
NB/PE Operations Manager /
Senior Project Professional

ATTACHMENT A
Analytical Summary Tables – Sediment Samples



Table A.1 PAH Results for Marine Sediments - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Sample Identification and Date				Nova Scotia Environmental Quality Standards											
			Potable Site		Non-Potable Site		Potable Site		Non-Potable Site		Potable Site		Non-Potable Site					
			JQ-39-SED-2012-07-31-1	JQ-48-SED-2012-07-31-1	JQ-90-SED-2012-07-31-1	JQ-99-SED-2012-07-31-1	JQ-120-SED-2012-07-31-1	Freshwater	Marine	Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/Parkland Land Uses	Commercial and Industrial Land Uses			
Polycyclic Aromatic Hydrocarbon (PAH) Results																		
1-Methylnaphthalene	0.0050		<0.0050	0.013	<0.0050	<0.0050	0.201	0.201	42	42	42	30	30	30	72	72	560	560
2-Methylnaphthalene	0.0050		<0.0050	0.016	<0.0050	<0.0050	0.201	0.201	42	42	42	30	30	30	72	72	560	560
Acenaphthene	0.0050		0.018	0.044	<0.0050	0.0869	0.0869	8000	8000	8000	21.5	21.5	8000	8000	21.5	3900	8000	8000
Acenaphthylene	0.0050		<0.0050	<0.0050	<0.0050	0.128	0.128	32	32	32	4.5	4.5	23	4.5	33	4.5	96	66
Anthracene	0.0050		0.021	0.047	<0.0050	0.245	0.245	2.5	24000	37000	2.5	2.5	24000	37000	2.5	24000	37000	37000
Benzo(a)anthracene	0.0050		0.050	0.075	<0.0050	0.365	0.365	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Benzo(b)fluoranthene	0.0050		0.021	0.039	<0.0050	0.782	0.782	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benzo(k)fluoranthene	0.0050		0.031	0.053	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Benzo(g,h,i)perylene	0.0050		0.046	0.08	0.005	3.2	3.2	8.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Benzo(e)pyrene	0.0050		0.015	0.021	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Benzo(a)pyrene	0.0050		0.015	0.028	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Chrysene	0.0050		0.071	0.10	<0.0050	0.862	0.862	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
Dibenz(a,h)anthracene	0.0050		<0.0050	<0.0050	<0.0050	0.135	0.135	15.4	3500	5300	15.4	15.4	5300	5300	15.4	3500	5300	5300
Fluorene	0.0050		0.13	0.25	0.0098	2.395	1.494	15.4	2700	4100	15.4	15.4	4100	4100	15.4	2700	4100	4100
Fluoranthene	0.0050		0.027	0.047	<0.0050	0.144	0.144	15.4	2700	4100	15.4	15.4	4100	4100	15.4	2700	4100	4100
Indeno(1,2,3-cd)pyrene	0.0050		0.013	0.020	<0.0050	3.2	0.88	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Naphthalene	0.0050		0.013	0.020	<0.0050	0.391	0.391	0.75	28	28	28	0.6	2.2	25	0.75	51	370	25
Perylene	0.0050		0.050	0.068	0.012	0.515	0.515	7.8	17	17	7.8	7.8	17	17	7.8	17	17	17
Phenanthrene	0.0050		0.060	0.14	0.068	0.875	1.388	7.7	2100	3200	7.7	7.7	2100	3200	7.7	2100	3200	3200
Pyrene	0.0050		0.080	0.14	0.068	0.875	1.388	7.7	2100	3200	7.7	7.7	2100	3200	7.7	2100	3200	3200
Benzo(a)pyrene TPE (10 ⁶)			0.037	0.063	0.006	0.006	0.006	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Creosote or Coal Tar source suspected/known?	yes/no		Unknown	Unknown	No	No	No											
Uncertainty Factor Applied	yes/no		Yes	Yes	No	No	No											
Benzo(a)pyrene TPE (10 ⁶) with UF	mg/kg		0.11	0.19	0.23	Not Applicable	Not Applicable	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations.

Total Polycyclic Aromatic Hydrocarbon (TPA) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10⁻⁵).

Benzo(a)pyrene TPE (10⁶) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Polarity Equivalency Factors: ((Benz(a)anthracene)*0.1) + ((Benz(a)anthracene)*0.1) + ((Benz(a)anthracene)*0.1) + ((Chrysene)*0.01) + ((Dibenz(a,h)anthracene)*1) + ((Indeno(1,2,3-cd)pyrene)*0.1).

Benzo(a)pyrene TPE Uncertainty Factor = 3.

Light values indicate results below detection limit.

Table A.2 PAH Results for Leachate Samples - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Sample Identification and Date		Surface Water		Nova Scotia Environmental Quality Standards					
			JQ-48-SED-2012 07-31-1	JQ-90-SED-2012 07-31-1	Freshwater		Potable		Non-Potable		Groundwater	
					31-Jul-12	Marine	Coarse- and Fine-Grained Soils	Agricultural/ Residential and Commercial/ Industrial Land Uses	Fine-Grained Soils	Coarse-Grained Soils	Agricultural/ Residential Land Use	Commercial/ Industrial Land Use
Leachable Polycyclic Aromatic Hydrocarbons (PAHs)												
1-Methylnaphthalene	0.010		<0.010	0.019	2	1	12	35000	150000	6200	38000	
2-Methylnaphthalene	0.010		0.012	0.016	2	2	12	35000	150000	6200	38000	
Acenaphthene	0.0050		0.046	0.17	5.8	6	1400					
Acenaphthylene	0.0050		<0.0050	<0.0050	4.6	6	4.5	120	1700	36	750	
Anthracene	0.0050		0.015	0.028	0.012							
Benz(a)anthracene	0.0050		<0.0050	<0.0050	0.018							
Benzo(a)pyrene	0.0050		<0.0050	<0.0050	0.015	0.01	0.01					
Benzo(b)fluoranthene	0.0050		<0.0050	<0.0050	0.48							
Benzo(g,h,i)perylene	0.0050		<0.0050	<0.0050	0.17							
Benzo(j)fluoranthene	0.0050		<0.0050	<0.0050	0.48							
Benzo(k)fluoranthene	0.0050		<0.0050	<0.0050	0.48							
Chrysene	0.0050		<0.0050	0.0052	1.4	0.1						
Dibenz(a,h)anthracene	0.0050		<0.0050	<0.0050	0.26							
Fluoranthene	0.0050		0.056	0.095	0.04	11						
Fluorene	0.0050		0.046	0.096	3	12	940					
Indeno(1,2,3-cd)pyrene	0.0050		<0.0050	<0.0050	0.21							
Naphthalene	0.0050		0.024	0.054	1.1	1.4	470	14000		600	7000	
Perylene	0.0050		<0.0050	<0.0050								
Phenanthrene	0.0050		0.065	0.059	0.4	4.6						
Pyrene	0.0050		0.034	0.054	0.025	0.02	710					

NOTE(S):

Yellow highlighted values indicate exceedance of NS EQS for Surface Water (Freshwater).

Underlined values indicate exceedance of NS EQS for Surface Water (Marine).

Table A.3 Metal Results for Marine Sediments - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Nova Scotia Environmental Quality Standards									
			Sample Identification and Date					Sediment Environment		Potable and Non-Potable Sites with Coarse- and Fine-Grained Soils		
			JQ-39-SED-2012-07-31-1	JQ-39-SED-2012-07-31-1-DUP	JQ-48-SED-2012-07-31-1	JQ-90-SED-2012-07-31-1	JQ-99-SED-2012-07-31-1	JQ-120-SED-2012-07-31-1	Freshwater	Marine	Agricultural Land Use	Residential/Parkland Land Use
Aluminum	10		11000	12000	12000	11000	3400	2300	15400	15400	15400	198000
Antimony	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	7.5	63	63	63
Arsenic	2.0		5.8	6.4	6.0	5.7	2.1	<2.0	17	31	31	31
Barium	5.0		110	140	130	100	48	67	400	10000	15000	140000
Beryllium	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	5	38	320	320
Boron (Total)	5.0		43	30	32	38	12	<5.0	4300	4300	24000	24000
Boron (Hot Water Soluble)	0.30		Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	2			
Cadmium	0.2		0.53	0.43	0.52	0.46	<0.30	<0.30	3.5	4.2	14	49
Chromium (Hexavalent)	0.2		<0.2	Not Analyzed	<0.2	<0.2	<0.2	<0.2	0.4	160	1300	1300
Chromium (Total)	2.0		19	22	21	19	5.7	3.7	90	52	220	2300
Cobalt	1.0		9.9	11	11	9.4	3.4	2.2	20	22	250	250
Copper	2.0		22	27	25	25	5.4	<2.0	197	108	4000	16000
Cyanide (Total)	50		Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	0.9	29	110	420
Iron	0.50	mg/kg	27000	25000	25000	27000	7400	5800	43766	11000	11000	144000
Lead	0.50		19	21	20	18	5.3	3.4	91.3	112	140	740
Manganese	2.0		290	300	340	280	150	130	1100	0.7	6.6	24
Mercury (Total)	0.10		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.486	0.7	6.6	24
Methylmercury	0.10		Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	1	1.6	1.6	20
Molybdenum	2.0		4.6	4.4	3.8	4.4	<2.0	<2.0	40	110	1200	1200
Nickel	2.0		22	24	25	21	6.0	3.4	75	330	2200	2200
Selenium	1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2	2.2	80	125
Silver	0.50		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	20	77	490
Strontium	5.0		37	33	38	40	14	9.2	9400	9400	9400	122000
Thallium	0.10		0.22	0.20	0.19	0.18	<0.10	<0.10	1	1	1	1
Tin	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	5	23	33	300
Uranium	0.10		1.4	1.5	1.3	1.3	0.66	0.26	39	39	160	160
Vanadium	2.0		26	28	27	25	10	9.1	315	271	5600	47000
Zinc	5.0		74	83	82	74	25	16	200	271	5600	47000

NOTE(S):

Undefined values indicate exceedance of NS EQS for Agricultural Land Use.

Italicized values indicate exceedance of NS EQS for Residential/Parkland Land Use.

Underlined border values indicate exceedance of NS EQS for Commercial Land Use.

Light values indicate results below detection limit.



Table A.4 BTEX/TPH Results for Marine Sediments - Baxter's Cove DFO-SCH₁, Inverness County, NS

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Total TPH	Reached Baseline at C32	Resemblance	Methyl Tert Butyl Ether (MTBE)		
			Benzene	Toluene	Ethylbenzene	Xylene	C ₆ -C ₁₀	C ₁₀ -C ₁₆	C ₁₆ -C ₂₃	C ₂₁ -C ₃₂	Modified TPH (Less BTEX)	Total TPH						
JQ-39-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	25	38	62		Yes	One Product in Fuel/Lube Range. Lube Oil Fraction.				
JQ-39-2012-07-31-1-DUP			<0.0050	<0.025	<0.010	<0.050	<2.5	31	48	63	140		Yes	One Product in Fuel/Lube Range. Lube Oil Fraction.				
JQ-48-2012-07-31-1	31-Jul-12	mg/kg	<0.0050	<0.025	<0.010	<0.050	<2.5	<10	41	88	130		Yes	One Product in Fuel/Lube Range. Lube Oil Fraction.				
JQ-90-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	39	58	97		Yes	One Product in Fuel/Lube Range. Lube Oil Fraction.				
JQ-99-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	<10	<15		Not Applicable	No Resemblance				
JQ-120-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	<10	<15		Not Applicable	No Resemblance				
RDL			0.0050	0.025	0.010	0.050	2.5	10	10	15	15							
Guidelines																		
Benzene			Ethylbenzene				Gasoline				Diesel / No. 2 Fuel Oil		No. 6 Oil / Lube Oil		Modified TPH (Less BTEX)		Total TPH	
Nova Scotia Environmental Quality Standards																		
Soils																		
Agricultural Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	150	150	300	300					0.05		
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	210	150	150	1300	1300					0.05		
Residential/ Parkland Land Use	Potable	Coarse-Grained Soil	0.99	75	30	8.8	74	150	150	300	300					0.05		
	Non-Potable	Fine-Grained Soil	2.3	10000	120	65	210	270	1100	1100	10000					1.1		
	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	150	150	300	300					0.05		
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	1900	270	270	11000	11000					0.05		
Commercial and Industrial Land Uses	Potable	Coarse-Grained Soil	2.3	10000	30	8.8	74	150	150	300	300					0.05		
	Non-Potable	Fine-Grained Soil	2.3	10000	9000	210	2100	8600	10000	10000	10000					1.1		
	Potable	Coarse-Grained Soil	0.042	0.35	0.065	11	870	1800	1800	10000	10000					0.062		
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700	4700	10000	10000					0.05		
Sediment		Coarse-Grained Soil	2.5	10000	10000	110	870	4000	4000	10000	10000					0.57		
		Fine-Grained Soil	33	10000	10000	10000	10000	10000	10000	10000	10000					7.4		
Sediment Environment		Freshwater	1.2	1.4	1.2	1.3	15	25	25	43	43				500			
		Marine	1.2	1.4	1.2	1.3	15	25	25	43	43				500			

NOTE(S):
 Yellow highlighted values indicate exceedance of NS EQS for Surface Water (Freshwater).
 Underlined values indicate exceedance of NS EQS for Surface Water (Marine).
 Light values indicate results below detection limit.



Table A.3 PCB and DDT Results for Marine Sediments - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Sample Identification and Date				Nova Scotia Environmental Quality Standards																			
			JC-39-SED-2012-07-31-1		JC-48-SED-2012-07-31-1		JC-90-SED-2012-07-31-1		JC-98-SED-2012-07-31-1		JC-120-SED-2012-07-31-1		Potable Site			Non-Potable Site										
			Freshwater	Marine	Freshwater	Marine	Freshwater	Marine	Freshwater	Marine	Freshwater	Marine	Fine-Grained Soils	Coarse-Grained Soils												
Polychlorinated Biphenyl (PCB) Results																										
Total PCB Concentration	0.010	mg/kg	0.034	0.027	0.027	0.037	0.017	0.017	<0.010	<0.010	0.277	0.189	33	33	1.3	1.3	22	22	33	33	1.3	1.3	22	22	33	33
Dichloro-Diphenyl-Trichloroethane (DDT) Results																										
p,p'-DDE	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDE	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDD	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDD	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDT	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDT + p,p'-DDD	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDD + p,p'-DDD	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
p,p'-DDE + p,p'-DDE	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
Total DDT	0.0020-0.030		<0.030	<0.030	<0.030	<0.030	<0.010	<0.010	<0.020	<0.020																
NOTE(S):																										
All results below the laboratory detection limit were divided by 2 prior to further calculations.																										
Yellow highlight indicate undetermined/exceedance of NS EQS for Sediment Environments (Freshwater and/or Marine) as laboratory reporting limit is above guideline.																										
Light values indicate results below detection limit.																										

ATTACHMENT B
Analytical Summary Tables – Soil Samples



Table B.1 PAH Results for Soil - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Sample Identification and Date										Sediment Environment		Nova Scotia Environmental Quality Standards											
			JQ-01-SL-2012 07-31-1		JQ-02-SL-2012 07-31-1		JQ-03-SL-2012 07-31-1		JQ-04-SL-2012 07-31-1		Freshwater		Marine		Potable Site				Non-Potable Site							
			31-Jul-12												Fine-Grained Soil		Coarse-Grained Soil		Fine-Grained Soil		Coarse-Grained Soil					
			Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses		Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses		Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses		Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses		Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses		Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses	
Polycyclic Aromatic Hydrocarbon (PAH) Results																										
1-Methylnaphthalene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.201	0.201	42	42	42	30	30	30	30	72	72	72	560	560	72	72	72	560	560	
2-Methylnaphthalene	0.0050		<0.0050	0.0094	<0.0050	<0.0050	0.201	0.201	42	42	42	30	30	30	30	72	72	72	560	560	72	72	72	560	560	
Acenaphthene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.0689	0.0689	21.5	5300	8000	21.5	3900	8000	8000	21.5	5300	21.5	8000	8000	21.5	3900	21.5	8000	8000	
Acenaphthylene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.128	0.128	32	32	32	4.5	4.5	4.5	4.5	33	33	33	96	96	4.5	4.5	4.5	96	96	
Anthracene	0.0071		<0.0050	<0.0050	<0.0050	<0.0050	0.245	0.245	2.5	24000	37000	2.5	24000	37000	37000	2.5	24000	2.5	37000	37000	2.5	24000	2.5	37000	37000	
Benzo(a)anthracene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.385	0.385	0.63	0.63	0.63	0.5	0.5	0.5	0.5	0.63	0.63	0.5	37000	37000	0.5	24000	0.5	37000	37000	
Benzo(a)pyrene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.782	0.782	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Benzo(b)fluoranthene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	
Benzo(g,h)perylene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	3.2	3.2	8.3	8.3	8.3	6.6	6.6	6.6	6.6	8.3	8.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
Benzo(k)fluoranthene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	
Benzo(k)fluoranthene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	
Chrysene	0.019		<0.0050	<0.0050	<0.0050	<0.0050	0.862	0.862	0.846																	
Dibenz(a,h)anthracene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.135	0.135	0.135																	
Fluoranthene	0.0050		0.022	0.019	0.018	0.015	2.355	1.494	15.4	3500	5300	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	
Fluorene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	0.144	0.144	0.144	2700	4100	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	
Indeno(1,2,3-cd)pyrene	0.0050		<0.0050	<0.0050	<0.0050	<0.0050	3.2	0.98	0.48	0.48	0.48	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.019	0.016	0.391	0.391	0.391	28	28	28	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Benzo(a)pyrene	0.0050		0.016	0.016	0.01																					

Table B.2 Metal Results for Soil - Baxter's Cove DFO-SCH, Inverness County, NS

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Environmental Quality Standards				
			31-Jul-12						Sediment Environment		Potable and Non-Potable Sites with Coarse- and Fine-Grained Soils		
			JQ-01-SL-2012 07-31-1	JQ-01-SL-2012 07-31-1-DUP	JQ-02-SL-2012 07-31-1	JQ-03-SL-2012 07-31-1	JQ-04-SL-2012 07-31-1	Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
Aluminum	10		4400	3600	4400	3900	3000			15400	15400	15400	198000
Antimony	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	25		7.5	7.5	63	63
Arsenic	2.0		4.3	3.3	4.1	3.7	3.1	17	41.6	17	31	31	31
Barium	5.0		50	37	61	46	36			400	10000	15000	140000
Beryllium	2.0		<2.0	<2.0	<2.0	<2.0	<2.0	38		5	38	320	320
Boron (Total)	20		<20	<20	<20	<20	<20			4300	4300	24000	24000
Boron (Hot Water Soluble)			Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed			2			
Cadmium	0.30		0.31	<0.30	0.34	0.35	<0.30	3.5	4.2	1.4	14	49	192
Chromium (Hexavalent)	0.2		<0.2	Not Analyzed	<0.2	<0.2	<0.2			0.4	160	1300	1300
Chromium (Total)	2.0		8.1	6.7	7.9	7.1	5.0	90	160	52	220	630	2300
Cobalt	1.0		4.7	3.6	4.4	4.0	3.1			20	22	250	250
Copper	2.0		8.3	6.2	8.1	7.1	5.0	197	108	63	1100	4000	16000
Cyanide (Total)			Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed			0.9	29	110	420
Iron	50		10000	8600	10000	9100	6900	43766		11000	11000	11000	144000
Lead	0.50		7.2	5.9	7.7	6.3	5.3	91.3	112	70	140	260	740
Manganese	2.0		170	140	170	160	130	1100		6.6	6.6	24	99
Mercury (Total)	0.10		<0.10	Not Analyzed	<0.10	<0.10	<0.10	0.486	0.7	1	1.6	1.6	20
Methylmercury			Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed			40	110	1200	1200
Molybdenum	2.0		<2.0	<2.0	<2.0	<2.0	<2.0			50	330	2200	2200
Nickel	2.0		10	8.5	11	9.4	6.6	75		1	80	125	1135
Selenium	1.0		<1.0	<1.0	<1.0	<1.0	<1.0	2		1	77	490	490
Silver	0.50		<0.50	<0.50	<0.50	<0.50	<0.50	1	2.2	20	77	9400	122000
Strontium	5.0		70	48	77	78	65			9400	9400	9400	1
Thallium	0.10		<0.10	<0.10	<0.10	<0.10	<0.10			1	1	1	1
Tin	2.0		<2.0	<2.0	<2.0	<2.0	<2.0			5	9400	9400	122000
Uranium	0.10		0.66	0.48	0.69	0.64	0.45			23	23	33	300
Vanadium	2.0		12	11	12	11	8.9			39	39	160	160
Zinc	5.0		33	30	35	32	24	315	271	200	5600	47000	47000

NOTE(S):

Light values indicate results below detection limit.



Table B.3 BTEX/TPH Results for Soil - Baxter's Cove DFO-SCH, Inverness County, NS

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Reached Baseline at C32	Resemblance	Methyl Tert Butyl Ether (MTBE)
			Benzene	Toluene	Ethylbenzene	Xylene	C ₆ -C ₁₀	C ₁₀ -C ₁₆	C ₁₆ -C ₂₄	C ₂₁ -C ₃₂	Modified TPH (Less BTEX)	Total TPH			
JQ-01-SL-2012-07-31-1	31-Jul-12	mg/kg	<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	26	26		Yes	Lube Oil Fraction.	
JQ-02-SL-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	26	26		Yes	Lube Oil Fraction.	
JQ-03-SL-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	23	23		Yes	Lube Oil Fraction.	
JQ-04-SL-2012-07-31-1			<0.0050	<0.025	<0.010	<0.050	<2.5	<10	<10	26	26		Yes	Lube Oil Fraction.	
RDL			0.0050	0.025	0.010	0.050	2.5	10	10	15					
Guidelines			Benzene	Toluene	Ethylbenzene	Xylene	Gasoline	Diesel / No. 2 Fuel Oil	No. 6 Oil/ Lube Oil	Modified TPH (Less BTEX)	Total TPH				
Nova Scotia Environmental Quality Standards															
Soils															
Agricultural Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	7.4	150	300	300					0.05
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	210	150	1300	1300					0.05
Residential/ Parkland Land Use	Potable	Coarse-Grained Soil	0.99	10000	120	65	210	150	1300	1300					1.1
	Non-Potable	Fine-Grained Soil	2.3	0.35	0.065	8.8	7.4	270	1100	1100					0.05
Commercial and Industrial Land Uses	Potable	Coarse-Grained Soil	0.042	0.74	0.13	22	1900	4700	10000	10000					0.05
	Non-Potable	Fine-Grained Soil	0.094	10000	30	8.8	7.4	270	1100	1100					1.1
Sediment	Freshwater	Coarse-Grained Soil	2.3	10000	9300	210	2100	8600	10000	10000					0.062
	Marine	Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700	10000	10000					0.05
Sediment Environment	Freshwater	Coarse-Grained Soil	2.5	10000	10000	110	870	4000	10000	10000					0.57
	Marine	Fine-Grained Soil	33	10000	10000	10000	10000	10000	10000	10000					7.4
NOTE(S):			1.2	1.4	1.2	1.3	1.5	25	43	43	500				
Light values indicate results below detection limit.			1.2	1.4	1.2	1.3	1.5	25	43	43	500				



**PWGSC PROJECT #R.070368.006
MARINE SEDIMENT SAMPLING PROGRAM
Judique (Baxters Cove) DFO-SCH
Judique, Nova Scotia**

FINAL REPORT

Submitted to:
Public Works and Government Services Canada
Halifax, Nova Scotia

Submitted by:
**Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited**
Dartmouth, Nova Scotia

March 2015

TV141222



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6 March, 2015

TV141222

Mr. Troy Young, B.Sc.
Environmental Specialist
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Dear Mr. Young:

**Re: Marine Sediment Sampling Program at the Judique (Baxters Cove) Fisheries and Oceans
Small Craft Harbour, Nova Scotia - Final Report**

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited, is pleased to provide Public Works and Government Services Canada the findings of a Marine Sediment Sampling Program undertaken at the Judique (Baxters Cove) Fisheries and Oceans Canada - Small Craft Harbour in Nova Scotia.

Amec Foster Wheeler appreciates the opportunity to provide services to your organization. Please do not hesitate to call if you have any questions regarding this, or any other matter.

Respectfully submitted,

**Chyann M. Kirby, B.Sc., EP, P.Tech.
Senior Environmental Scientist**

Direct Tel.: 506.652.4530 (or 506.652.9497 ext. 226)

Direct Fax: 506.652.9517

E-mail: chyann.kirby@amecfw.com

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Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
50 Troop Avenue, Unit 300
Dartmouth, Nova Scotia B3B 1Z1
Tel +1 (902) 468-2848
Fax +1 (902) 468-1314

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EXECUTIVE SUMMARY

Two (2) sediment samples were collected within the Judique (Baxters Cove) Fisheries and Oceans Canada (DFO) - Small Craft Harbour (SCH) in Nova Scotia on 8 December, 2014. The samples were submitted to AGAT Laboratories for detailed analyses. Results were compared to the *Canadian Environmental Protection Act* (CEPA) Disposal at Sea Lower Level Screening Criteria; Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health (1999a); Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 3.0 Risk-Based Screening Levels (RBSLs) and Sediment Ecological Screening Levels (SESLs) for the Protection of Freshwater and Marine Aquatic Life (2012); Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992); and Nova Scotia Tier 1 Environmental Quality Standards (EQS) (2013). Table ES1, below, reports the summarized guideline exceedance results of the sediment analysis for the field program. Figure ES1 (below) depicts the summarized substrate composition for the samples collected from the Judique (Baxters Cove) DFO-SCH.

Table ES1 Sediment Analysis Guideline Exceedance Table

Guideline / Parameter	Sample ID	
	JB-4	JB-21
CEPA Disposal at Sea – Lower Level Screening Criteria		
PAHs ¹	-	-
Metals	-	-
PCBs ²	-	-
CCME SQGs		
PAHs	-	-
Metals	-	-
BTEX ³	-	-
PCBs	-	-
DDT ⁴	-	-
Atlantic RBCA Tier 1 Version 3.0 RBSLs and SESLs		
BTEX	-	-
TPH ⁵	-	-
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills		
PAHs	-	-
Metals	-	●
BTEX	-	-
PCBs	-	-
Nova Scotia Tier 1 EQS		
PAHs	-	-
Metals	-	-
BTEX	-	-
TPH	-	-
PCBs	-	-

Notes:

“-“ indicates no exceedance

“●“ indicates exceedance

1 – PAH - polycyclic aromatic hydrocarbon

2 – PCB - polychlorinated biphenyl

3 – BTEX - benzene, toluene, ethylbenzene, and xylene

4 – DDT - dichloro-diphenyl-trichloroethane

5 – TPH - total petroleum hydrocarbons

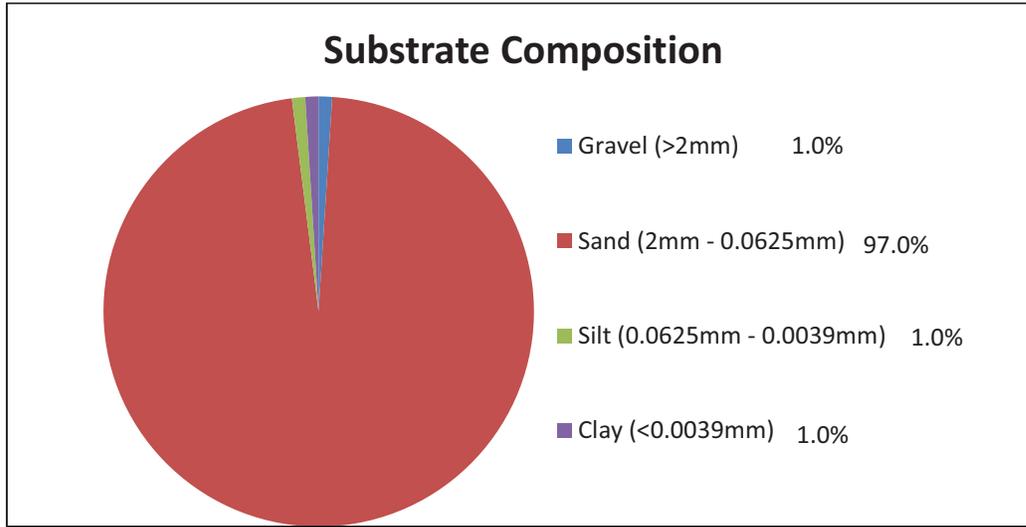


Figure ES1 Substrate Composition Averaged from Sampling Locations at the Judique (Baxters Cove) DFO-SCH, Nova Scotia

Based on the results of the sediment analysis, one (1) sample was submitted for Synthetic Precipitation Leaching Procedure (SPLP) leachate analysis for boron. Results from this sample were compared to the CCME Canadian Water Quality Guidelines (WQGs) for the Protection of Aquatic Life (1999b); Health Canada Canadian Guidelines for Drinking Water Quality (CGDWQ) (2014); Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992); and Nova Scotia Tier 1 EQS (2013). Table ES2, below, reports the summarized guideline exceedance results for the leachate analyses completed on the sediment sample.

Table ES2 Leachate Analysis Guideline Exceedance Table

Guideline / Parameter	Sample ID
	JB-21
CCME WQGs for the Protection of Aquatic Life	
Metals	-
Health Canada CGDWQ	
Metals	-
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills	
Metals	-
Nova Scotia Tier 1 EQS	
Metals	-

Notes:
 - " indicates no exceedance

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1.0 INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), two (2) stations were sampled within the footprint of the proposed dredging area at the Judique (Baxters Cove) Fisheries and Oceans (DFO) - Small Craft Harbour (SCH) on 8 December 2014.

2.0 SCOPE AND METHODOLOGY

2.1 Site Plan

The selection of sample stations for the Marine Sediment Sampling Program (MSSP) followed guidance provided in the Environmental Protection Series: *Users Guide to the Application Form for Ocean Disposal* (Environment Canada, 1995), whereby a random approach was implemented for the location of sampling stations in the proposed dredge area of the SCH. The unstratified area was divided into square blocks where at least five times as many blocks as the number of stations required was used (minimum of 30 blocks). A random number generator software program was used to derive the sampling locations within this dredge area (Figure 2.1).

A detailed program design was prepared by Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) and submitted to PWGSC on 28 November 2014 for review and approval prior to field program implementation.

Sample collection, preparation, and analyses were conducted in accordance with Environment Canada's publication *Guidance Document on Collection and Preparation of Sediments for Physicochemical Characterization and Biological Testing* (1994). Connors Diving Services Limited was retained to collect the sediment samples. The sample collection field program was completed in accordance with guidelines defined by provincial Occupational Health and Safety Standards.

2.2 Sample Collection and Analysis

The marine sediment samples were collected by divers at the selected sampling stations. A handheld Garmin Global Positioning System (GPS) was used to georeference the sampling location coordinates that were derived prior to field program initiation. Sample station coordinates are listed in Figure 2.1. Appendix A is comprised of a collection of photos taken of the sample locations during the field program.

Duplicate samples were collected from all stations to safeguard against loss or damage during transport. All samples were then stored in the laboratory-supplied jars and kept in a cooler until the field program was completed. Upon completion of the field program, the samples were chilled and delivered to the laboratory for select chemical analyses. The duplicate sediment samples were refrigerated and stored at the Amec Foster Wheeler office in Dartmouth, Nova Scotia.

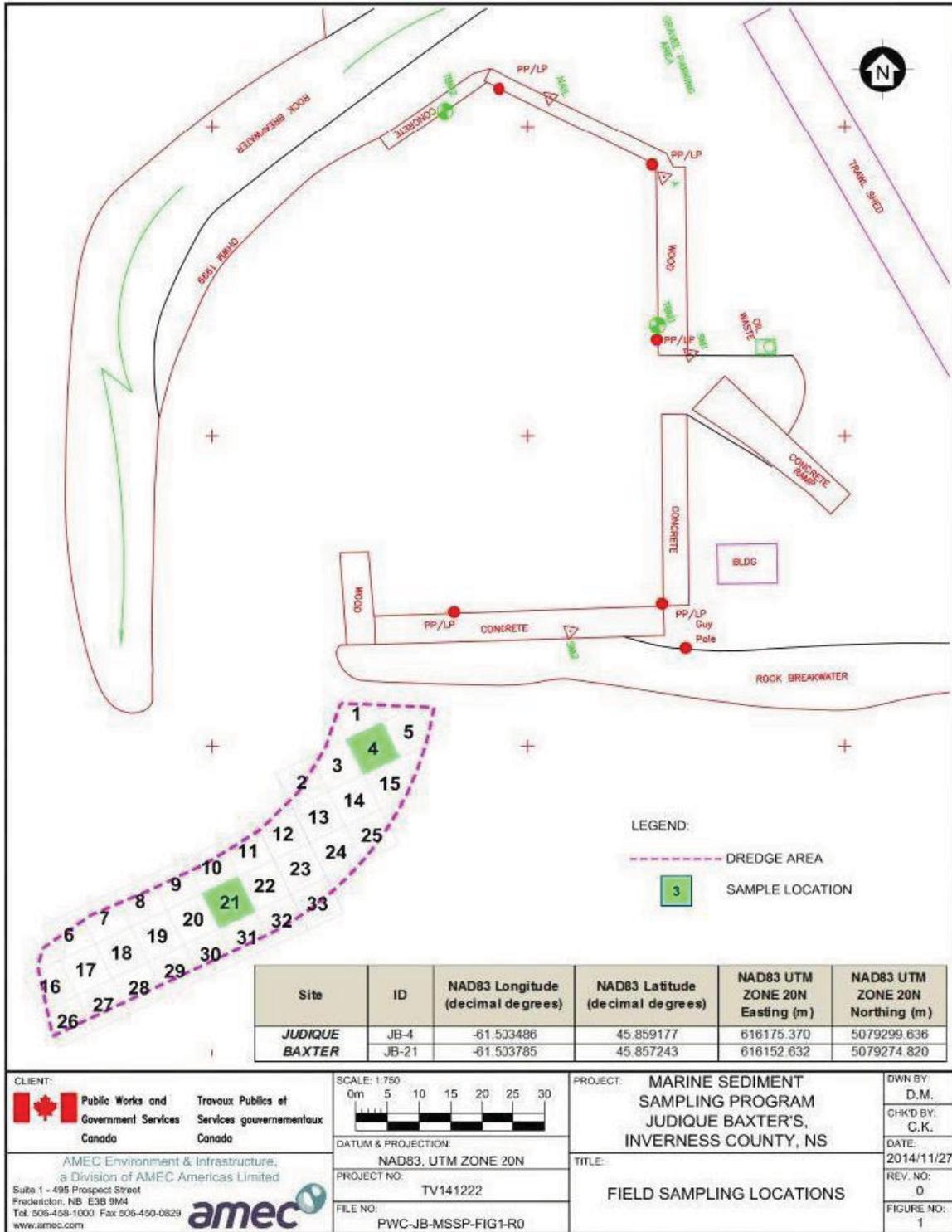


Figure 2.1 Sampling Locations at the Judique (Baxters Cove) DFO-SCH (8 December 2014)

AGAT Laboratories (AGAT) in Dartmouth, Nova Scotia, an accredited laboratory with the Canadian Association for Laboratory Accreditation (CALA) and ISO/IEC 17025 certified for all of the analyses required for this Project, was engaged to conduct the laboratory analyses. At the request of PWGSC, the samples were submitted for the typical ocean and land disposal suite of parameters which includes ICP 23 metals scan plus mercury, hexavalent chromium, tin, hot water soluble boron, and low level selenium; low level polycyclic aromatic hydrocarbons (PAHs); total inorganic and total organic carbon (TIC/TOC); total polychlorinated biphenyls (PCBs); total dichloro-diphenyl-trichloroethane (DDT); low level benzene, toluene, ethylbenzene, and xylene (BTEX); total petroleum hydrocarbons (TPHs), including a qualitative assessment for presence/absence of creosote; and grain size. Silica gel clean up was completed for all samples analyzed for petroleum hydrocarbons and a return to baseline at C32 was verified.

The requirement for Synthetic Precipitation Leaching Procedure (SPLP) Leachate (Environmental Protection Agency (EPA), *Methodology 1312*) was determined in conjunction with PWGSC upon receipt and review of initial sample results (EPA, 1994). This analysis was performed for select samples with parameters exceeding applicable guidelines.

3.0 ANALYTICAL RESULTS

The analytical results of the marine sediment samples collected and analysed from the Judique (Baxters Cove) DFO-SCH are summarized in Tables B.1 to B.10 (Appendix B) and discussed below. The complete set of analytical results, including laboratory Quality Assurance/Quality Control (QA/QC) and Certificates of Analyses for all parameters tested, are provided in Appendix C.

In order to facilitate the determination of all disposal options, the tabulated analytical sample results were compared to the following, where applicable:

- *Canadian Environmental Protection Act (CEPA) Disposal at Sea Regulations (formerly the Ocean Dumping Control Act) – Lower Level Screening Criteria.*
- *Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines - Interim Sediment Quality Guidelines (ISQGs) and Marine and Estuarine Probable Effects Levels (PELs) (1999c).*
- *CCME Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health in agricultural, residential/parkland, and commercial/industrial applications (1999a).*
- *Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 3.0 Risk-Based Screening Levels (RBSLs) and Sediment Ecological Screening Levels (SESLs) for the Protection of Freshwater and Marine Aquatic Life (2012).*
- *Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992).*
- *Nova Scotia Tier 1 Environmental Quality Standards (EQS) (2013).*
- *CCME Water Quality Guidelines (WQGs) (1999b).*
- *Health Canada's Canadian Guidelines for Drinking Water Quality (CGDWQ) (2014).*

Results as compared to the afore-noted guidelines, with the exception of the CCME Sediment Quality Guidelines (ISQGs and PELs), are discussed further in this report.

3.1 PAH Concentrations

PAHs were not detected in either of the samples collected at the Judique (Baxters Cove) DFO-SCH. No exceedances of the CEPA Disposal at Sea Screening Criteria - Lower Level, CCME SQGs - Human Health (Potable Water) and (Direct Contact), CCME SQGs - Environmental Health (Soil Contact), (Soil and Food Ingestion), and (Freshwater Life), Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992) or Nova Scotia Tier 1 EQS were noted in either of the samples (Tables B.1 and B.2).

3.2 Metal Concentrations

CEPA Disposal at Sea Screening Criteria - Lower Level

No exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria were noted in the two samples collected (Table B.3).

CCME SQGs

Neither of the two samples collected in the area to be dredged exceeded the CCME SQGs for any land use applications (Table B.3).

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)

One of the two samples collected (JB-21) exceeded the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills for boron (Table B.4).

Nova Scotia Tier 1 EQS

No exceedances of the Nova Scotia Tier 1 EQS for Sediment Environments (Freshwater and Marine) or soils (Potable and Non-potable sites, all land use applications) were noted in the two samples collected (Table B.4).

SPLP Metals Leachate Results

One samples (JB-21) was submitted for SPLP metals leachate analysis for boron only, based on the noted guideline exceedance and discussions with PWGSC.

CCME WQGs for the Protection of Aquatic Life (Freshwater and Marine)

No exceedance of the CCME WQGs for the Protection of Aquatic Life (Freshwater) for boron was noted in the leachate sample (Table B.5).

Health Canada CGDWQ (Maximum Acceptable Concentration and Aesthetic Objective)

The Health Canada CGDWQ (Maximum Acceptable Concentration) for boron was not exceeded in sample JB-21 (Table B.5).

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)

No exceedance of the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992) for boron was noted in the leachate sample (Table B.5).

Nova Scotia Tier 1 EQS

No exceedances of the Nova Scotia Tier 1 EQS for Surface Water (Freshwater and Marine) and for Groundwater (potable) for boron were noted in sample JB-21 (Table B.5).

3.3 Petroleum Hydrocarbon Concentrations

Modified TPH values reflect the sum of the individual carbon fractions that resembles gasoline, diesel #2, and lube oil. Neither BTEX nor TPH were detected in either of the samples collected at the Judique (Baxters Cove) DFO-SCH. Both samples reached baseline at C₃₂ (Tables B.6 and B.7).

No exceedances of the Atlantic RBCA Tier 1 Version 3.0 RBSLs and SESLs for the Protection of Freshwater and Marine Aquatic Life, CCME SQGs, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted in either of the samples collected (Tables B.6 and B.7).

3.4 PCBs Concentrations

PCBs were not detected in either of the samples collected at the Judique (Baxters Cove) DFO-SCH and no exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria, CCME SQGs for all land use applications, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted in the samples collected (Tables B.8 and B.9).

3.5 DDT Concentrations

Total DDT refers to the sum of dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD), and DDT. Neither DDE, DDD, or DDT were detected in either of the samples collected at the Judique (Baxters Cove) DFO-SCH and no exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria, CCME SQGs for all land use applications, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted in either of the samples collected (Tables B.8 and B.9).

3.6 Carbon Content

Samples collected from the Judique (Baxters Cove) DFO-SCH showed total carbon content ranging from 0.15 to 0.30 grams per kilogram (g/kg) (Table B.10). TOC was not detected in either sample, while TIC ranged from not detected in sample JB-4 to 0.22 g/kg in sample JB-21 (Table B.10).

3.7 Grain Size Distribution

Sediment composition is described in Figure 3.1 and Table 3.1 below, and in Table B.10. Figure 3.1 illustrates the overall sediment composition from the samples collected within the SCH, expressed as percentages to show the average grain size distributions. Table 3.1 breaks down the sediment composition at each sampling location.

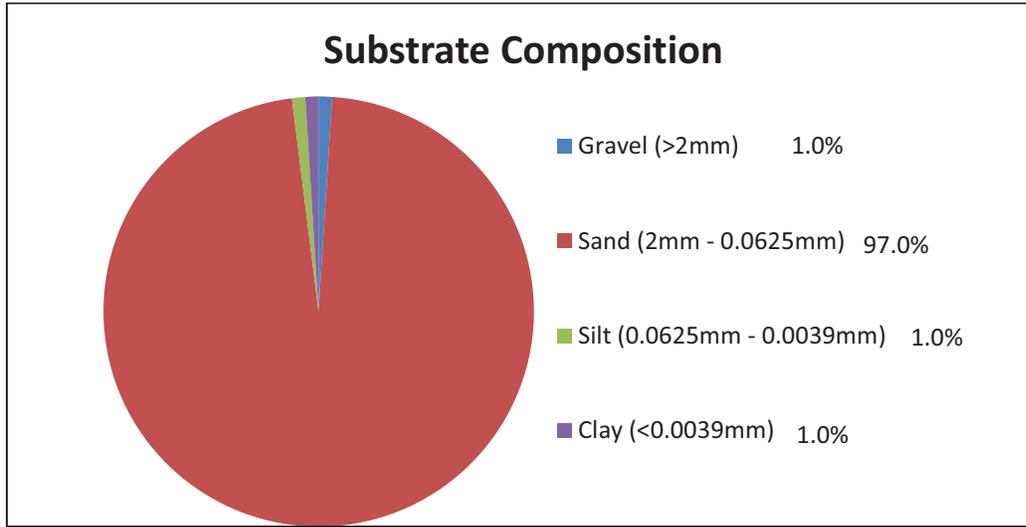


Figure 3.1 Substrate Composition Averaged from Sampling Locations at the Judique (Baxters Cove) DFO-SCH, Nova Scotia

Table 3.1 Dominant Sediment Types at Each Sample Location

Sample ID	Sediment Distribution			
	Primary Substrate	Secondary Substrate	Tertiary Substrate	Quaternary Substrate
JB-4	Sand	Silt / Clay	-	-
JB-21	Sand	Gravel	Silt / Clay	-

Notes:
 "-" indicates none detected.

4.0 BENTHIC PHOTOGRAPH DESCRIPTION

A series of underwater photographs were collected at each of the sampling locations that show the substrate and any flora and fauna at the site. Photographs are presented in Appendix A and characterization of the photographs collected at each of the sampling locations is provided below.

Sample Station JB-4

The substrate appears to be predominantly sand. Shell hache is present, but otherwise the photos are devoid of flora or fauna.

Sample Station JB-21

The substrate appears to be predominantly sand. Shell hache is present, but otherwise the photos are devoid of flora or fauna.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

All samples collected were labelled on site using a waterproof marker with the date, sample site identifier, and sample number. The samples were placed upright on ice inside a cooler for safe storage and transport, and were delivered to the laboratory following program completion. A copy of the Chain of Custody (COC) that accompanied the samples is provided in Appendix C.

Additional samples were collected to safeguard against loss or damage during transport, and will be stored and refrigerated until the PWGSC Project Manager provides approval to dispose/destroy the samples.

Sample collection, preparation, and analyses followed guidance provided in the afore-referenced Environment Canada document. Samples were analyzed by an accredited laboratory with CALA and/or ISO/IEC 17025 and are certified by the Standards Council of Canada (SCC) for each selected chemical analyses of this program. The complete set of analytical results, including laboratory QA/QC and Certificates of Analyses for all parameters tested, are provided in Appendix C.

The laboratory undertakes internal duplicate analyses for QA/QC purposes. Laboratory duplicate analyses were performed on all of the parameters analyzed for this program to meet internal QA/QC objectives for the Judique (Baxters Cove) samples submitted. No discrepancies were noted by the laboratory for the analyses performed.

To assess the quality of the analytical data, a review of the internal laboratory QA/QC results was completed and included a review of laboratory duplicate analyses, method blanks, surrogates, spike samples, and QA/QC standards. This review did not reveal any information or discrepancies that may affect the analytical results of the Judique (Baxters Cove) samples.

A senior Amec Foster Wheeler reviewer has reviewed this report prior to its release. The limitations of this document are provided in Appendix D.

6.0 CONCLUSION

The analytical results of the ten samples collected and analysed from the Judique (Baxters Cove) DFO-SCH indicate exceedance of only the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills for one marine sediment sample (JB-21) for boron. Leachate results identified no exceedances of any regulatory guidelines.

7.0 CLOSING

This document has been prepared and reviewed by the following people:

Prepared by:



Maureen Cameron-MacMillan, M.Sc.
Technical Support /
Intermediate Project Professional

Reviewed by:



Kerry Higgins, B.Sc., EP
NB/PE Operations Manager /
Senior Project Professional

8.0 REFERENCES

- Atlantic Risk-Based Corrective Action (RBCA). 2012. Atlantic RBCA (Risk-Based Corrective Action), for Petroleum Impacted Sites in Atlantic Canada Tier I Version 3, User Guidance. Issued on, July 2012. Available online at: http://www.atlanticrbc.com/data_eng/ATLANTIC_RBCA_User_Guidance_v3_July_2012doc_final.pdf.
- Canadian Council of Ministers of the Environment (CCME). 1999a (updates). Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health in agricultural, residential/parkland, and commercial/industrial applications. Available online at: <http://cegg-rcqe.ccme.ca/en/index.html#void>.
- Canadian Council of Ministers of the Environment (CCME). 1999b (updates). Canadian Water Quality Guidelines, 1999 with updates. Available on-line at: <http://cegg-rcqe.ccme.ca/en/index.html#void>.
- Canadian Council of Ministers of the Environment (CCME). 1999c (updates). CCME Sediment Quality Guidelines - Interim Sediment Quality Guidelines and Marine and Estuarine Probable Effects Levels. Available online at: <http://cegg-rcqe.ccme.ca/en/index.html#void>.
- Environment Canada. 1994. Guidance document on collection and preparation of sediments for physicochemical characterization and biological testing. Environmental Protection Series. Report EPS 1/RM/29, December 1994.
- Environment Canada. 1995. User's Guide to the Application Form for Ocean Disposal. Report EPS 1/MA/1, December 1995.
- Environmental Protection Agency (EPA). 1994. Methodology 1312 - Synthetic Precipitation Leaching Procedure.
- Health Canada. 2014. Guidelines for Canadian Drinking Water Quality – Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. Available on-line at: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf.
- Nova Scotia Department of Environment. 2013. Notification of Contamination Protocol.
- Nova Scotia Environment and Labour (NSEL). 1992. Guidelines for Disposal of Contaminated Solids in Landfills.



APPENDIX A
Photo Log

General Site Photos



Looking west from wharf toward end of breakwater



Looking northeast toward middle of harbour.

Sample Station JB-4



The substrate appears to be predominantly sand. Shell hash is present, but otherwise the photos are devoid of flora or fauna.

Public Works and Government Services Canada
Marine Sediment Sampling Program
Judique (Baxters Cove) DFO-SCH, NS
Program Date: 8 December, 2014
Photo Log

Sample Station JB-21



The substrate appears to be predominantly sand. Shell hache is present, but otherwise the photos are devoid of flora or fauna.



APPENDIX B
Analytical Summary Tables

Table B.1 PAH Results for Marine Sediments as Compared to Federal Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines			
			JB-4	JB-21		Interim Sediment Quality Guidelines		Probable Effects Levels		Human Health		Environmental Health	
						Freshwater	Marine	Freshwater	Marine	Potable Water	Direct Contact	Soil Contact	Soil and Food
			8 December, 2014			Freshwater	Marine	Freshwater	Marine	Agricultural, Residential, Commercial and Industrial Land Uses			
Polycyclic Aromatic Hydrocarbon (PAH) Results													
1-Methylnaphthalene	0.05		<0.05	<0.05		0.0202	0.0202	0.201	0.201				
2-Methylnaphthalene	0.02		<0.02	<0.02		0.00671	0.00671	0.0889	0.0889				0.28
Acenaphthene	0.00671		<0.00671	<0.00671		0.00587	0.00587	0.128	0.128				320
Acenaphthylene	0.005		<0.005	<0.005		0.0469	0.0469	0.245	0.245			2.5	3.2
Anthracene	0.04		<0.04	<0.04		0.0371	0.0371	0.385	0.385				6.2
Benz(a)anthracene	0.01		<0.01	<0.01		0.0319	0.0319	0.782	0.782			20	72
Benz(a)pyrene	0.01		<0.01	<0.01									0.6
Benz(b)fluoranthene	0.05		<0.05	<0.05									6.2
Benz(b+g)fluoranthene	0.1		<0.1	<0.1									
Benz(g,h,i)perylene	0.01		<0.01	<0.01									
Benz(k)fluoranthene	0.01		<0.01	<0.01									
Benz(k)fluoranthene	0.01		<0.01	<0.01									
Chrysene	0.01		<0.01	<0.01		0.0571	0.108	0.862	0.846	0.034			6.2
Dibenz(a,h)anthracene	0.006		<0.006	<0.006		0.00622	0.00622	0.135	0.135	0.23			6.2
Fluoranthene	0.05		<0.05	<0.05		0.111	0.113	2.355	1.494			50	15.4
Fluorene	0.02		<0.02	<0.02		0.0212	0.0212	0.144	0.144				15.4
Indeno(1,2,3-cd)pyrene	0.01		<0.01	<0.01						2.7			0.25
Naphthalene	0.01		<0.01	<0.01		0.0346	0.0346	0.391	0.391				8.8
Perylene	0.05		<0.05	<0.05									
Phenanthrene	0.04		<0.04	<0.04		0.0419	0.0867	0.515	0.544				43
Pyrene	0.05		<0.05	<0.05		0.053	0.153	0.875	1.398				7.7
Total PAH	0.5		<0.5	<0.5	2.5								
Index of Additive Cancer Risk (IACR)	Calculation	None	0.51	0.51						1			
Benz(a)pyrene TPE (10 ⁻⁵)	Calculation	mg/kg	0.0146	0.0146									
Creosote or Coal Tar source suspected/known?	yes/no		No	No									
Uncertainty Factor Applied	yes/no		No	No									
Benz(a)pyrene TPE (10 ⁻⁵) with UF	Calculation	mg/kg	Not Applicable	Not Applicable									

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations.
 Total PAH calculation based on the sum of 16 individual PAH compounds (acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benz(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) as per guidance from Environment Canada, 2009.
 Additive Cancer Risk (IACR) = (Benz(a)anthracene)/0.33mg/kg + (Benz(a)pyrene)/0.37mg/kg + ((Benz(b+g)fluoranthene)/0.16mg/kg + (Benz(g,h,i)perylene) + (Benz(k)fluoranthene)/0.034mg/kg) + ((Chrysene)/2.1mg/kg) + ((Dibenz(a,h)anthracene)/0.23mg/kg) + ((Indeno(1,2,3-cd)pyrene)/2.7mg/kg).
 Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10⁻⁵).
 Benz(a)pyrene TPE (10⁻⁵) = Sum of PAH concentration multiplied by their respective Benz(a)pyrene Potency Equivalency Factors: ((Benz(a)anthracene)*0.1) + ((Benz(a)pyrene)*1) + ((Benz(b+g)fluoranthene)*0.1) + ((Benz(k)fluoranthene)*0.1) + ((Chrysene)*0.01) + ((Dibenz(a,h)anthracene)*1) + ((Indeno(1,2,3-cd)pyrene)*0.1).
 Benz(a)pyrene TPE Uncertainty Factor = 3.
 Light values indicate results below detection limit.

Table B.2 PAH Results for Marine Sediments as Compared to Provincial Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Sample Identification and Date		Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)		Sediment Environment		Nova Scotia Tier 1 Environmental Quality Standards										
		JB-4	JB-21	Freshwater		Marine		Potable Site			Non-Potable Site							
				Fine-Grained Soil		Coarse-Grained Soil		Fine-Grained Soil			Coarse-Grained Soil							
		Units	Units	Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/Parkland Land Use	Commercial and Industrial Land Uses			
Polycyclic Aromatic Hydrocarbon (PAH) Results																		
1-Methylnaphthalene	0.05	<0.05	<0.05	10	0.201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
2-Methylnaphthalene	0.02	<0.02	<0.02	10	0.201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
Acenaphthene	0.00671	<0.00671	<0.00671	10	0.0889	0.0889	21.5	5300	8000	21.5	3900	8000	21.5	5300	8000	21.5	3900	8000
Acenaphthylene	0.005	<0.005	<0.005	10	0.128	0.128	32	32	32	4.5	4.5	4.5	33	33	96	4.5	4.5	66
Anthracene	0.04	<0.04	<0.04	10	0.245	0.245	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000
Benzo(a)anthracene	0.01	<0.01	<0.01	10	0.385	0.385	0.63	0.63	0.63	0.5	0.5	0.5	0.63	0.63	0.5	0.5	0.5	0.5
Benzo(a)pyrene	0.01	<0.01	<0.01	10	0.782	0.782	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Benzo(b)fluoranthene	0.05	<0.05	<0.05	10	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Benzo(b)fluoranthene	0.1	<0.1	<0.1	10	3.2	3.2	8.3	8.3	8.3	6.6	6.6	6.6	8.3	8.3	6.6	6.6	6.6	6.6
Benzo(g,h)perylene	0.01	<0.01	<0.01	10	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Benzo(k)fluoranthene	0.01	<0.01	<0.01	10	13.4	4.5	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Chrysene	0.01	<0.01	<0.01	10	0.862	0.862	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Dibenz(a,h)anthracene	0.006	<0.006	<0.006	10	0.135	0.135	15.4	3600	5300	15.4	3600	5300	15.4	3600	5300	15.4	3600	5300
Fluoranthene	0.03	<0.03	<0.03	10	2.93	0.124	15.4	2700	4100	15.4	2700	4100	15.4	2700	4100	15.4	2700	4100
Fluorene(1,2,3-cd)pyrene	0.01	<0.01	<0.01	10	3.2	0.58	0.48	0.48	0.48	0.38	0.38	0.38	0.48	0.48	0.38	0.38	0.38	0.38
Naphthalene	0.01	<0.01	<0.01	10	0.391	0.391	0.75	28	28	0.6	0.6	0.6	0.75	0.75	0.6	0.6	0.6	0.6
Perylene	0.05	<0.05	<0.05	10	0.515	0.544	7.8	17	24	6.2	17	17	7.8	7.8	6.2	6.2	6.2	6.2
Phenanthrene	0.04	<0.04	<0.04	10	0.875	1.398	7.7	2100	3200	7.7	2100	3200	7.7	2100	3200	7.7	2100	3200
Pyrene	0.05	<0.05	<0.05	10	0.875	1.398	7.7	2100	3200	7.7	2100	3200	7.7	2100	3200	7.7	2100	3200
Total PAH	0.5	<0.5	<0.5	50														
Benzo(a)pyrene TPE (10 ⁵)	Calculation	0.0146	0.0146				5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Cresote or Coal Tar source suspected/known?	yes/no	No	No															
Uncertainty Factor Applied	yes/no	No	No															
Benzo(a)pyrene TPE (10 ⁵) with UF	Calculation	Not Applicable	Not Applicable				5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3

NOTE(S):
 All results below the laboratory detection limit were divided by 2 prior to further calculations.
 Total PAH calculation based on the sum of 16 individual PAH compounds (acenaphthene, anthracene, benz(a)anthracene, benz(a)pyrene, benzo(b)fluoranthene, benzo(g,h)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) as per guidance from Environment Canada, 2009.
 Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10⁻⁵).
 Benzo(a)pyrene TPE (10⁵) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Potency Equivalency Factors: (Benzo(a)anthracene) * 0.1 + (Benzo(a)pyrene) * 1 + (Benzo(b)fluoranthene) * 0.1 + (Benzo(k)fluoranthene) * 0.1 + ((Chrysene) * 0.01) + ((Dibenz(a,h)anthracene) * 1) + ((Indeno(1,2,3-cd)pyrene) * 0.01) + ((Fluorene) * 0.01) + ((Fluoranthene) * 0.01) + ((Phenanthrene) * 0.01) + ((Pyrene) * 0.01).
 Light values indicate results below detection limit.

Table B.3 Metal Results for Marine Sediments as Compared to Federal Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines							
			JB-4	JB-21		Interim Sediment Quality Guidelines		Probable Effects Levels		Agricultural Land Use	Residential/Parkland Land Use	Commercial Land Use	Industrial Land Use				
			8 December, 2014			Freshwater	Marine	Freshwater	Marine								
Aluminum	10		1990	2710													
Antimony	1		<1	<1									20	20	40	40	
Arsenic	1		8	277		5.9	7.24	17.0	41.6				12	12	12	12	12
Barium	5												750	500	2000	2000	2000
Beryllium	2		<2	<2									4	4	8	8	8
Boron (Total)	2		2	3													
Boron (Hot Water Soluble)	0.10		1.26	1.37													
Cadmium	0.3		<0.3	<0.3	0.6	0.6	0.7	3.5	4.2				1.4	10	22	22	22
Chromium (Hexavalent)	0.4		<0.4	<0.4									0.4	0.4	1.4	1.4	1.4
Chromium (Total)	2		2	4		37.3	52.3	90.0	160				64	64	87	87	87
Cobalt	1		1	2									40	50	300	300	300
Copper	2		<2	3	81*	35.7	18.7	197	108				63	63	91	91	91
Iron	50	mg/kg	3200	4860													
Lead	0.5		2.5	3.6	66*	35.0	30.2	91.3	112				70	140	260	260	600
Manganese	2		76	140													
Mercury (Total)	0.05		<0.05	<0.05	0.75	0.17	0.13	0.486	0.7				6.6	6.6	24	24	50
Molybdenum	2		2	3									5	10	40	40	50
Nickel	2		<2	3									50	50	50	50	50
Selenium	1		<1	<1									1	1	2.9	2.9	2.9
Silver	0.5		<0.5	<0.5									20	20	40	40	40
Strontium	5		8	14													
Thallium	0.1		<0.1	<0.1									1	1	1	1	1
Tin	2		4	4									5	50	300	300	300
Uranium	0.1		0.2	0.3									23	23	33	33	300
Vanadium	2		5	9									130	130	130	130	130
Zinc	5		13	19	160*	123	124	315	271				200	200	360	360	360

NOTE(S):
 L1, Environment Canada, pers. comm., June 2002).
 Light values indicate results below detection limit.

Table B.4 Metal Results for Marine Sediments as Compared to Provincial Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Sediment Environment			Nova Scotia Tier 1 Environmental Quality Standards			
			JB-4	JB-21		Freshwater	Marine	Agricultural Land Use	Residential/Parkland Land Use	Commercial Land Use	Industrial Land Use	
			8 December, 2014									
Aluminium	10		1990	2710				15400	15400	15400	15400	198000
Antimony	1		<1	<1	40			7.5	7.5	63	63	63
Arsenic	1		8	2	50		41.6	17	31	31	31	31
Barium	5		277	277	2000			400	10000	15000	140000	
Beryllium	2		<2	<2	8			5	38	320	320	320
Boron (Total)	2		3	3	2			4300	4300	24000	24000	24000
Boron (Hot Water Soluble)	0.10		1.37	1.37				2				
Cadmium	0.3		<0.3	<0.3	20		4.2	3.5	1.4	49	49	192
Chromium (Hexavalent)	0.4		<0.4	<0.4	8				0.4	160	1300	1300
Chromium (Total)	2		4	4	800		160	90	52	630	630	2300
Cobalt	1		2	2	300				20	250	250	250
Copper	2		<2	3	500		108	197	63	1100	4000	16000
Iron	50		3200	4860	1000		43766	91.3	11000	11000	11000	144000
Lead	0.5		2.5	3.6	1000			91.3	70	140	260	740
Manganese	2		76	140	1100			1100				
Mercury (Total)	0.05		<0.05	<0.05	10		0.7	0.486	6.6	6.6	24	99
Molybdenum	2		<2	<2	40				40	110	1200	1200
Nickel	2		2	3	500		75	75	50	330	2200	2200
Selenium	1		<1	<1	10		2	2	1	80	125	1135
Silver	0.5		<0.5	<0.5	40		1	1	20	77	490	490
Strontium	5		8	14	1				9400	9400	9400	122000
Thallium	0.1		<0.1	<0.1	1				1	1	1	1
Tin	2		4	4	300				5	9400	9400	122000
Uranium	0.1		0.2	0.3	200				23	23	33	300
Vanadium	2		5	9	1500				39	39	160	160
Zinc	5		13	19	1500		271	315	200	5600	47000	47000

NOTE(S):

Light values indicate results below detection limit.

Yellow highlight indicates exceedance of Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992).

Table B.5 Metal Results for Leachate Samples as Compared to Federal and Provincial Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date	CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life		Health Canada Guidelines for Canadian Drinking Water Quality		Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards											
				Freshwater	Marine	Maximum Acceptable Concentration	Aesthetic Objective		Surface Water		Groundwater									
									Freshwater	Marine	Potable with Fine- and Coarse-Grained Soils	Non-Potable with Fine- and Coarse-Grained Soils								
Leachable Metals																				
Boron	50	ug/L	90	1500 - 29000	Marine	5000	500000	1200	1200	5000										

NOTE(S):

NA = Not Applicable as analysis not requested.

Boron: CCME CWQG for the Protection of Freshwater Aquatic Life = 29000 ug/L (short-term); 1500 ug/L (long-term).

Table B.6 BTEX/TPH Results for Marine Sediments as Compared to Federal Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Reached Baseline at C32	Resemblance	FOC
			Benzene	Toluene	Ethylbenzene	Xylene	C ₆ -C ₁₀	C ₁₀ -C ₁₆	C ₁₆ -C ₂₁	C ₂₁ -C ₃₂	Modified TPH (Less BTEX)				
JB-4	8 December, 2014	mg/kg	<0.005	<0.04	<0.01	<0.05	<3	<15	<15	<20	Yes	No Resemblance	0.002		
JB-21			<0.005	<0.04	<0.01	<0.05	<3	<15	<15	<20	Yes	No Resemblance	0.002		
RDL			0.005	0.04	0.01	0.05	3	15	15	20					
Guidelines															
			Benzene	Toluene	Ethylbenzene	Xylene	Gasoline	Diesel / No. 2 Fuel Oil	No. 6 Oil/ Lube Oil	Modified TPH (Less BTEX)					
Atlantic RBCA Tier I Version 3.0															
Risk-Based Screening Levels for Soil															
Agricultural/ Residential Land Use	Potable		0.042	0.35	0.065	8.8	74	270	1100						
	Non-Potable		0.094	0.74	0.13	22	1900	4700	10000						
Commercial/ Industrial Land Use	Potable		0.099	77	30	8.8	74	270	1100						
	Non-Potable		2.3	10000	9300	210	2100	8600	10000						
Residential Saturation	Potable		0.042	0.35	0.065	11	870	1800	10000						
	Non-Potable		0.094	0.74	0.13	22	1900	4700	10000						
Sediment Ecological Screening Levels for the Protection of Freshwater and Marine Aquatic Life	Potable		2.5	10000	10000	110	870	4000	10000						
	Non-Potable		33	10000	10000	10000	10000	10000	10000						
Sediment Type	Typical		1.2	1.4	1.2	1.3	15	25	43						
	Other		5.4	6.1	5	5.5	67	110	190						
CCME Soil Quality Guidelines															
Agricultural, Residential/ Parkland, Commercial, and Industrial Land Uses	Surface		0.03	0.37	0.082	11.0									
	Subsoil		0.0068	0.08	0.018	2.4									
NOTE(S):															
Fraction of Organic Content (FOC) = g-carbon/g-soil															
CCME Soil Quality Guidelines for benzene based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10 ⁻⁵).															
Light values indicate results below detection limit.															

Table B.7 BTEX/TPH Results for Marine Sediments as Compared to Provincial Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations						Reached Baseline at C32	Resemblance
			Benzene	Toluene	Ethylbenzene	Xylene	C ₆ -C ₁₀	C ₁₀ -C ₁₆	C ₁₆ -C ₂₁	C ₂₁ -C ₃₂	Modified TPH (Less BTEX)			
JB-4	8 December, 2014	mg/kg	<0.005	<0.04	<0.01	<0.05	<3	<15	<15	<15	<20	Yes	No Resemblance	
JB-21			<0.005	<0.04	<0.01	<0.05	<3	<15	<15	<15	<20	Yes	No Resemblance	
RDL			0.005	0.04	0.01	0.05	3	15	15	15	20			
Guidelines			Benzene	Toluene	Ethylbenzene	Xylene	Gasoline	Diesel / No. 2 Fuel Oil	No. 6 Oil/ Lube Oil	Modified TPH (Less BTEX)				
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)														
			5	30	50	50								
Nova Scotia Tier 1 Environmental Quality Standards														
Sediment														
Sediment Environment			1.2	1.4	1.2	1.3	15	25	43					
Freshwater			1.2	1.4	1.2	1.3	15	25	43					
Marine														
Soils														
Agricultural Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	150	300					
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	210	150	1300					
Residential/ Parkland Land Use	Potable	Coarse-Grained Soil	0.99	75	30	8.8	74	150	300					
	Non-Potable	Fine-Grained Soil	2.3	10000	120	65	210	150	1300					
Commercial and Industrial Land Uses	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	270	1100					
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700	10000					
NOTE(S):	Potable	Coarse-Grained Soil	0.99	77	30	8.8	77	270	1100					
	Non-Potable	Fine-Grained Soil	2.3	10000	9300	210	2100	8600	10000					
Light values indicate results below detection limit.	Potable	Coarse-Grained Soil	0.042	0.35	0.065	11	870	1800	10000					
	Non-Potable	Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700	10000					
			2.5	10000	10000	110	870	4000	10000					
			33	10000	10000	10000	10000	10000	10000					

NOTE(S): Light values indicate results below detection limit.

Table B.8 PCB and DDT Results for Marine Sediments as Compared to Federal Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Sample Identification and Date		CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines		
		JB-4	JB-21		Interim Sediment Quality Guidelines		Marine and Estuarine Probable Effects Levels		Agricultural Land Use	Residential/Parkland Land Use	Commercial/Industrial Land Use
					Freshwater	Marine	Freshwater	Marine			
Polychlorinated Biphenyl (PCB) Results											
Aroclor 1016	0.1	<0.1	<0.1								
Aroclor 1221	0.1	<0.1	<0.1								
Aroclor 1232	0.1	<0.1	<0.1								
Aroclor 1242	0.1	<0.1	<0.1								
Aroclor 1248	0.1	<0.1	<0.1								
Aroclor 1254	0.0633	<0.0633	<0.0633		0.060	0.0633	0.340	0.709			
Aroclor 1260	0.1	<0.1	<0.1								
Aroclor 1262	0.1	<0.1	<0.1								
Aroclor 1268	0.1	<0.1	<0.1								
Dieldrin	0.0007	<0.0007	<0.0007		0.00285	0.00071	0.00667	0.0043			
Total PCB Concentration	0.0215	<0.0215	<0.0215	0.1	0.0341	0.0215	0.277	0.189	0.5	1.3	33
Dichloro-Diphenyl-Trichloroethane (DDT) Results											
o,p-DDE	0.001	<0.001	<0.001								
p,p-DDE	0.001	<0.001	<0.001								
o,p-DDD	0.001	<0.001	<0.001								
p,p-DDD	0.001	<0.001	<0.001								
o,p-DDT	0.001	<0.001	<0.001								
p,p-DDT	0.001	<0.001	<0.001								
o,p-DDT + p,p-DDT	0.001	<0.001	<0.001		0.00119	0.00119	0.00477	0.00477			
o,p-DDD + p,p-DDD	0.001	<0.001	<0.001		0.00354	0.00122	0.00851	0.00781			
o,p-DDE + p,p-DDE	0.001	<0.001	<0.001		0.00142	0.00207	0.00675	0.37400	0.7	0.7	12
Total DDT (calculated)	0.001	<0.001	<0.001								

NOTE(S):

Light values indicate results below detection limit.

Table B.9 PCB and DDT Results for Marine Sediments as Compared to Provincial Criteria - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		Nova Scotia Guidelines for Disposal of Contaminated Landfills (1992)	Sediment Environment		Potable Site						Non-Potable Site					
			JB-4	JB-21		Freshwater	Marine	Fine-Grained Soils			Coarse-Grained Soils			Fine-Grained Soils			Coarse-Grained Soils		
								Agricultural Land Use	Residential/Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Residential/Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Fine-Grained Soils	Coarse-Grained Soils	Residential/Parkland Land Use
Polychlorinated Biphenyl (PCB) Results																			
Aroclor 1016	0.1		<0.1	<0.1															
Aroclor 1221	0.1		<0.1	<0.1															
Aroclor 1232	0.1		<0.1	<0.1															
Aroclor 1242	0.1		<0.1	<0.1															
Aroclor 1248	0.1		<0.1	<0.1															
Aroclor 1254	0.0633	mg/kg	<0.0633	<0.0633															
Aroclor 1260	0.1		<0.1	<0.1															
Aroclor 1262	0.1		<0.1	<0.1															
Aroclor 1268	0.1		<0.1	<0.1															
Dieldrin	0.0007		<0.0007	<0.0007		0.00667	0.0043	0.055	0.59	0.59	0.044	1.1	1.1	0.055	0.044	5.1	44		
Total PCB Concentration	0.0215		<0.0215	<0.0215	50	0.277	0.189	1.3	33	33	1.3	22	22	1.3	1.3	3.4	33		
Dichloro-Diphenyl-Trichloroethane (DDT) Results																			
p,p'-DDE	0.001		<0.001	<0.001															
p,p'-DDE	0.001		<0.001	<0.001															
p,p'-DDD	0.001		<0.001	<0.001															
p,p'-DDD	0.001		<0.001	<0.001															
p,p'-DDT	0.001		<0.001	<0.001															
p,p'-DDT	0.001		<0.001	<0.001															
p,p'-DDT + p,p'-DDT	0.001		<0.001	<0.001															
p,p'-DDD + p,p'-DDD	0.001		<0.001	<0.001															
p,p'-DDE + p,p'-DDE	0.001		<0.001	<0.001															
Total DDT (calculated)	0.001		<0.001	<0.001		0.00477	0.00477	0.7	220	340	0.7	220	220	0.7	0.7	340	1600		

NOTE(S):
Light values indicate results below detection limit.

Table B.10 Grain Size and Carbon Content Results for Marine Sediments - Judique (Baxters Cove) DFO-SCH, Antigonish County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date	
			JB-4	JB-21
8 December, 2014				
Grain Size Results				
< PHI -4 (12.5 mm)	0.1		100	100
< PHI -3 (9.5 mm)	0.1		100	100
< PHI -2 (4.75 mm)	0.1		100	100
< PHI -1 (2 mm)	0.1		100	97.6
< PHI 0 (1 mm)	0.1		98.7	97.1
< PHI +1 (1/2 mm)	0.1		95.5	95.7
< PHI +2 (1/4 mm)	0.1		15.4	56.8
< PHI +3 (1/8 mm)	0.1		2.1	6.4
< PHI +4 (1/16 mm)	0.1		1.7	2
< PHI +5 (1/32 mm)	0.1	%	1.6	2
< PHI +6 (1/64 mm)	0.1		1.6	2
< PHI +7 (1/128 mm)	0.1		1.5	1.6
< PHI +8 (1/256 mm)	0.1		1.3	1.3
< PHI +9 (1/512 mm)	0.1		1.3	1.3
Gravel	1		<1	2
Sand	1		98	96
Silt	1		1	1
Clay	1		1	1
Other				
Total Organic Carbon (TOC)	0.15	g/kg	<0.15	<0.15
Total Inorganic Carbon (TIC)	0.15	g/kg	<0.15	0.22
Total Carbon (TC)	Calculation	g/kg	0.15	0.30

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations.
 Light values indicate results below detection limit.

Public Works and Government Services Canada
Marine Sediment Sampling Program
Judique (Baxters Cove) DFO-SCH, Nova Scotia
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