Stantec Consulting Ltd.
845 Prospect Street, Fredericton, NB E3B 2T7

August 21, 2014
File: 121811228

Ms. Janet Fisher
Environmental Services
Public Works and Government Services Canada
3 Queen Street
Charlottetown, PE
C1A 7M8

Dear Ms. Fisher,

Reference: Composite Soil Sampling Program, Tignish/Judes Point DFO-SCH Facility, PE

Stantec Consulting Ltd. (Stantec) is pleased to provide the following results for the Tignish Composite Soil Sampling program. The sampling program was completed as per our proposals (dated July 10 and August 6, 2014) to collect and analyze soil samples from the historic and proposed dredge disposal area at the Tignish/Judes Point Small Craft Harbour in Tignish, PEI (Drawing 1 and 2, Attachment A). The dredge disposal area is located to the west of the Tignish Wharf. The soil sampling program is required as part of proposed construction activities that are to take place at this site in the next several months.

We understand that a combined 20,000 m^3 of soil is to be removed from the north and south berms in the dredge disposal area where dredged sediments were historically placed. We also understand that you are looking to determine soil quality of this material with a view of disposing of the material off-site either on provincially or federally regulated land.

Methodology

On July 17, 2014, ten-meter transects within each bermed area were set up to establish sampling points representative of each area. Forty samples were collected as shown on Drawing 2 from each berm area and equal amounts of each sample were combined to yield a composite sample. The two composite samples (labelled SS-01SC for the southern bermed area composite and SS-01NC for the northern bermed area composite) were analyzed for metals, mercury and hexavalent chromium, petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) pesticide suite, grain size distribution and SPLP leachate plus leachable sodium and leachable chloride.

A second round of soil sampling occurred on August 7, 2014 to target deeper soil horizons. Five test pits were excavated in each cell (as shown on Drawing 3). Samples were collected with an excavator generally at depths of 0.5 mbgs and 1.2 mbgs in the north containment cell and at depths of 1.2 mbgs and 2.4 mbgs in the south containment cell.

The water table was intercepted at depths ranging from 1.4 to 3.1 mbgs in the north cell, and 3.1 to 4.2 mbgs in the south cell. Two debris areas were identified in the southern cell. One that included primarily fishing traps and equipment was located in the vicinity of TP-1 and measured

Reference: Composite Soil Sampling Program, Tignish/Judes Point DFO-SCH Facility, PE

approximately 18 m in diameter. The second was mostly concrete rubble, measuring 7 m by 15 m. It was located in the vicinity of TP-4. This debris should be removed from the site for proper disposal prior to removing the soil.

Salinity in soil from each test pit location was estimated by Stantec by measuring electrical conductivity in decanted de-ionized water following the mixing of 5 parts of water to one part of soil (by weight).

The soil samples from the test pits were composited with equal amounts of each sample combined to yield two composite samples from each cell, one at each depth. Samples were labelled NC-CompA, NC-CompB, SC-CompA and SC-CompB. All composite samples were submitted to the Maxxam Analytics laboratory (Maxxam) in Bedford, NS. Maxxam is accredited by the Standards Council of Canada for each of the analytical methods utilized and has in-house QA/QC programs to govern sample analysis, including replicates. The composite samples were analyzed by Maxxam for metals, mercury, PHCs, PAHs, SPLP leachate plus leachable sodium and leachable chloride, sodium adsorption ratio and electrical conductivity.

Selection of Applicable Criteria

Chemical concentrations were compared to applicable provincial potable guidelines (Atlantic RBCA Tier I RBSLs and ESLs) for agricultural, residential, commercial and industrial land uses. Where provincial guidelines were not available (such as for metals, PCBs, DDT, sodium adsorption ratio, electrical conductivity and PAHs) the Canadian Council of Ministers of the Environment (CCME) soil quality guidelines (SQGs) were used. The federal index of additive cancer risk (IACR) for PAHs was modified using the Atlantic RBCA well dilution factor to make it consistent with the approach used to develop the Atlantic PIRI PHC screening levels for consumption of potable water.

Monitoring Results

Soil and groundwater measurements from the test pit program (soil electrical conductivity, estimated salinity in soil and depth to groundwater) are shown in Table 1, Attachment B. The field measurements for conductivity are consistent with the laboratory results. The calculated salinity values that were derived from the conductivity values do not indicate significant salt impacts in the dredged soil. These ranged from 0.01-0.59 parts per trillion (ppt) and the salinity of seawater is between 31 and 35 ppt. Analytical results from Maxxam are included in Tables 2 to 8, Attachment B. Laboratory certificates of analysis are included in Attachment C.

The grain size results classify the soil as coarse grained, as per ASTM soil classification standards. Parameter concentrations from all composite samples met the referenced Atlantic PIRI Tier I RSBLs and ESLs and all CCME SQGs for all land uses except as follows:

- phenanthrene and pyrene concentrations in one of six samples (SC-COMPA) and benzo[a]anthracene and benzo[b]fluoranthene concentrations in one other sample (NC-COMPA Lab-Dup), exceeded the CCME ecologically based agricultural soil guideline of 0.1 mg/kg; and

- naphthalene and phenanthrene concentrations in one of six soil samples (SC-COMPA) exceeded the CCME ecological guidelines for protection of freshwater aquatic life for all land uses.

CCME guidelines for the protection of freshwater aquatic life for naphthalene and phenanthrene are exceedingly low and are not much above the laboratory reporting limits. Note that despite the single sample exceedance of the CCME Protection of freshwater aquatic life guideline, all naphthalene and phenanthrene concentrations meet the CCME Probable Effects Levels for sediment (Table 5). This suggests that the naphthalene and phenanthrene concentrations in soil would be unlikely to affect freshwater aquatic life should the soil be placed close to a water body.

Summary

Thus all composite soil sample concentrations met the referenced human health guidelines for all land uses, and there were only minor exceedances of ecological guidelines for five PAH parameters related to agricultural land use.

Management Recommendations

Based on the above results, the soil from the two bermed areas is suitable for any land use from a human health perspective in potable or non-potable areas. From an ecological perspective, the soil is suitable for any land use other than an agricultural one.

Closing

This report has been prepared for the sole benefit of Public Works and Government Services Canada and Fisheries and Oceans Canada. This report may not be relied upon by any other person or entity without the express written consent of Stantec Consulting Ltd. and Public Works and Government Services Canada. Any use that a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions herein are based on information gathered at the specific sample locations and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends upon the soil and groundwater conditions as well as the history of the site reflecting natural, construction, or other activities. Analyses have been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present.

The conclusions presented herein represent the best judgment of the assessor based on current environmental standards. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities. Stantec certifies that to the best of our knowledge, the information is accurate.

Reference: Composite Soil Sampling Program, Tignish/Judes Point DFO-SCH Facility, PE

Should additional information become available, Stantec Consulting Ltd. requests that this information be brought to our attention so that we may re-assess the conclusions presented herein. This letter was written by Danya Macgillivray, P.Eng, and reviewed by Clayton Barclay, Ph.D., P.Eng.

We trust this letter is satisfactory for your present requirements. Should you have any questions or would like clarification on our intended scope of work, please do not hesitate to contact the undersigned.

Sincerely,

STANTEC CONSULTING LTD.

Danya MacGillivray, P.Eng.	Clayton Barclay, P.Eng.
Intermediate Project Professional	Senior Project Team Contact

Attachments: A - Drawings
B - Analytical Tables
C - Laboratory Certificates

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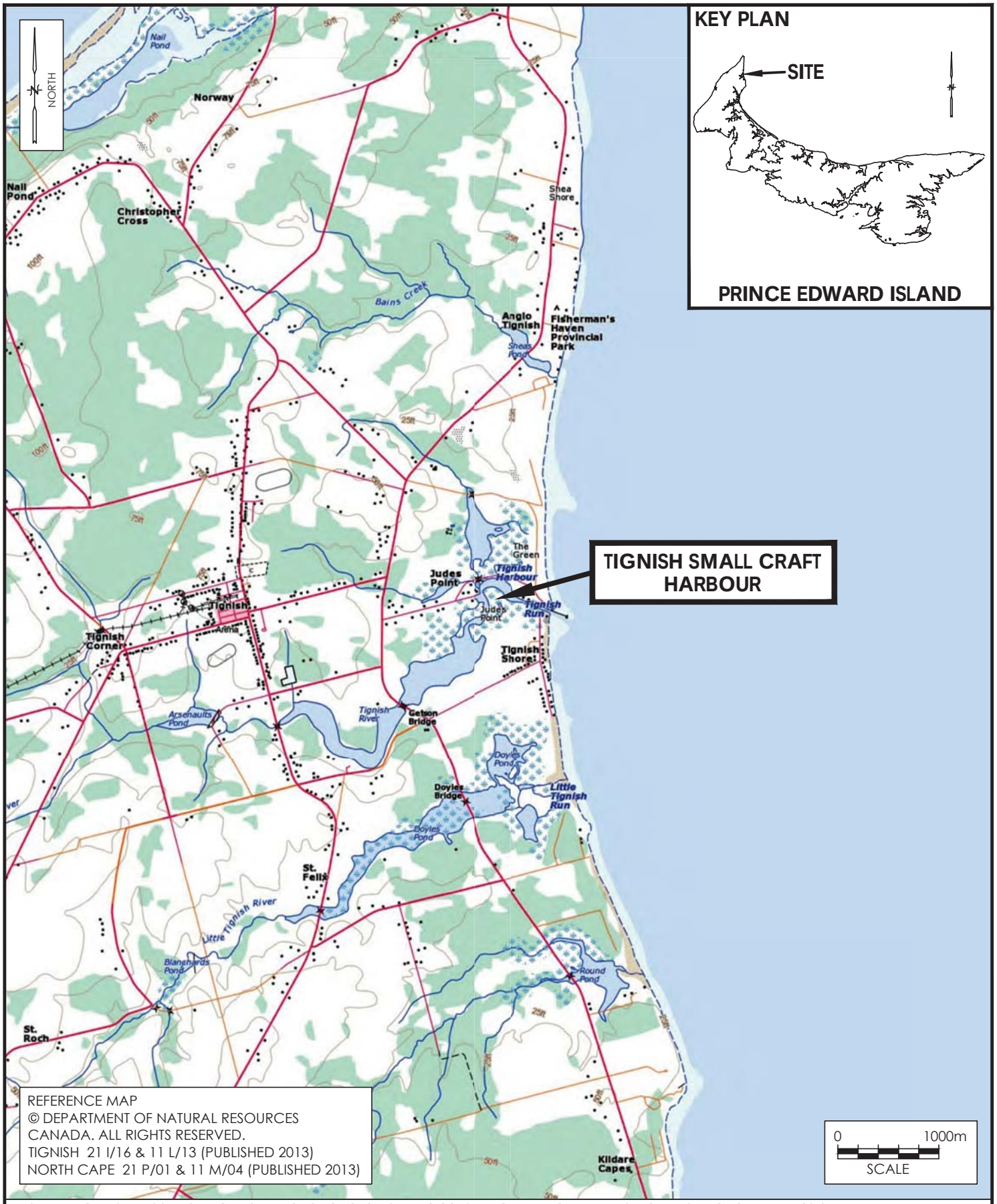
ATTACHMENT A

DRAWINGS



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

SITE LOCATION PLAN

TIGNISH AND JUDE'S POINT SMALL CRAFT HARBOUR
TIGNISH, PRINCE COUNTY, PRINCE EDWARD ISLAND
SCH # 2078, DFRP # 02264, RPIS # MS02078

Client: FISHERIES AND OCEANS CANADA

Job No.:	121811228
Scale:	1 : 50 000
Date:	28-JUL-2014
Dwn. By:	MA
App'd By:	DM

Dwg. No.: 1

Stantec

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LEGEND

SS-01N/SC COMPOSITE SAMPLE

SAMPLE LOCATION

PROPERTY BOUNDARY (DFO)

1 PHOTO NUMBER AND DIRECTION

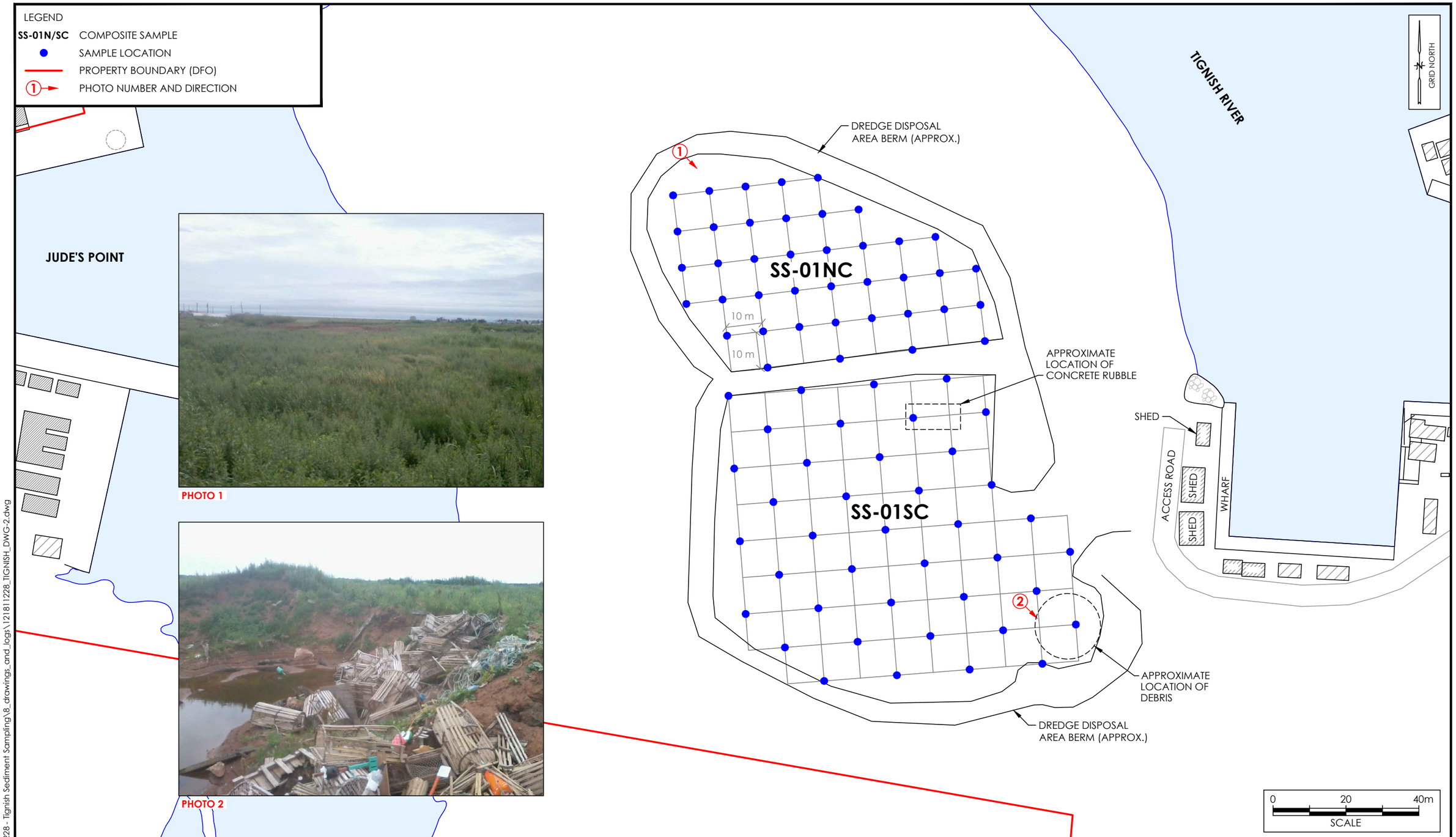

PHOTO 1

PHOTO 2

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

Reference:

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SAMPLE LOCATION PLAN

TIGNISH AND JUDE'S POINT SMALL CRAFT HARBOUR

TIGNISH, PRINCE COUNTY, PRINCE EDWARD ISLAND

SCH # 2078, DFRP # 02264, RPIS # MS02078

Client: FISHERIES AND OCEANS CANADA

Job No.:	121811228
Scale:	1 : 1000
Date:	21-AUG-2014
Dwn. By:	MA
App'd By:	CB

Dwg. No.: 2

Stantec

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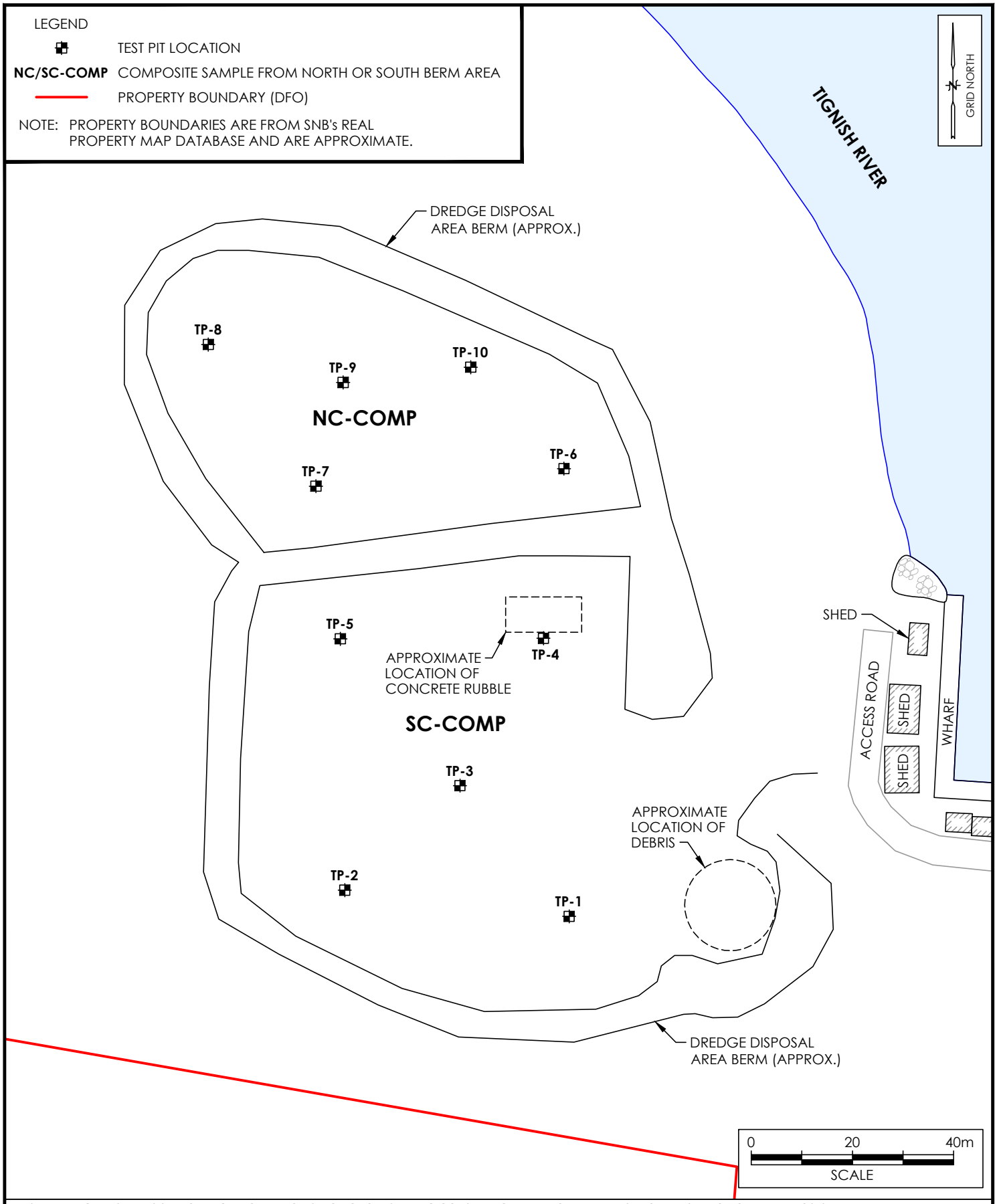

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

SAMPLE LOCATION PLAN

TIGNISH AND JUDE'S POINT SMALL CRAFT HARBOUR
TIGNISH, PRINCE COUNTY, PRINCE EDWARD ISLAND
SCH # 2078, DFRP # 02264, RPIS # MS02078

Job No.:	121811228
Scale:	1 : 1000
Date:	21-AUG-2014
Dwn. By:	MA
App'd By:	CB
Dwg. No.:	3

Client: FISHERIES AND OCEANS CANADA

Stantec

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ATTACHMENT B
ANALYTICAL TABLES

Table 1: Field Measurements from Test Pits at Tignish SCH - Historical Dredge Disposal Area

Conductivity was measured in the water following the mixing of 1 part soil to 5 parts distilled water on a mass basis. Conductivity was then converted to salinity using equation from Weyl (1964).

Sample Location	ID and Sample Depth	Conductivity (µS/cm)	Salinity (ppt)	Depth to groundwater (mbgs)	Time of Day during Excavation
TP1	SA-1 (1.2 m bgs)	1345	0.59	4.2	11:00 AM
TP1	SA-2 (2.4 m bgs)	292	0.11		
TP2	SA-1 (1.2 m bgs)	218	0.08	3.2	11:30 AM
TP2	SA-2 (2.4 m bgs)	227	0.08		
TP3	SA-1 (1.2 m bgs)	502	0.19	3.3	12:20 PM
TP3	SA-2 (2.4 m bgs)	379	0.14		
TP4	SA-1 (1.2 m bgs)	77	0.02	3.1	12:50 PM
TP4	SA-2 (2.4 m bgs)	152	0.05		
TP5	SA-1 (1.2 m bgs)	338	0.13	3.6	1:20 PM
TP5	SA-2 (2.4 m bgs)	233	0.08		
TP6	SA-1 (0.5 m bgs)	101	0.03	3.3	1:35 PM
TP6	SA-2 (1.2 m bgs)	241	0.09		
TP7	SA-1 (0.9 m bgs)	41	0.01	3.1	2:05 PM
TP7	SA-2 (1.8 m bgs)	189	0.07		
TP8	SA-1 (0.5 m bgs)	50	0.01	1.8	2:15 PM
TP8	SA-2 (1.2 m bgs)	323	0.12		
TP8	SA-1 (0.5 m bgs)	410	0.16	1.7	2:35 PM
TP9	SA-2 (1.2 m bgs)	213	0.07		
TP10	SA-1 (0.5 m bgs)	790	0.32	1.4	3:00 PM
TP10	SA-2 (1.2 m bgs)	282	0.10		

Note: salinity of seawater is between 31 and 35 ppt

- ppt = parts per trillion

- mbgs = meters below ground surface

Table 2. Tignish Historical Dredge Disposal Area - Metal Concentrations in mg/kg, Conductivity in µS/cm, and Sodium Adsorption Ratios in Soil

Parameters	Metal Concentration (mg/kg)										
	CCME Soil Quality Guideline				Sample ID						
					South Berm Area				North Berm Area		
	Agricultural	Residential / Parkland	Commercial	Industrial	Composite SS-01SC	SC-COMPA	SC-COMPB	SC-COMPB Lab-Dup	Composite SS-01NC	NC-COMPA	NC-COMPB
Aluminum	N/A	N/A	N/A	N/A	5100	4800	5800	5800	7200	5800	5500
Antimony	20	20	40	40	<2	<2	<2	<2	<2	<2	<2
Arsenic	12	12	12	12	2	<2	<2	<2	3	<2	<2
Barium	750	500	2000	2000	21	19	21	21	22	22	17
Beryllium	4	4	8	8	<2	<2	<2	<2	<2	<2	<2
Bismuth	N/A	N/A	N/A	N/A	<2	<2	<2	<2	<2	<2	<2
Boron	N/A	N/A	N/A	N/A	<50	<50	<50	<50	<50	<50	<50
Cadmium	1.4	10	22	22	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	64	64	87	87	10	10	12	11	15	11	11
Chromium (VI)	0.4	0.4	1.4	1.4	<0.2	N/A	N/A	N/A	<0.2	N/A	N/A
Cobalt	40	50	300	300	4	4	5	5	6	5	4
Copper	63	63	91	91	6	6	5	5	8	5	4
Iron	N/A	N/A	N/A	N/A	11000	11000	12000	12000	15000	12000	11000
Lead	70	140	260	600	4.9	6.9	5.2	5.3	6.0	3.9	3.7
Lithium	N/A	N/A	N/A	N/A	13	11	15	14	20	14	13
Manganese	N/A	N/A	N/A	N/A	230	180	220	230	280	200	190
Mercury	6.6	6.6	24	50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	5	10	40	40	<2	<2	<2	<2	<2	<2	<2
Nickel	50	50	50	50	10	9	12	11	15	11	11
Rubidium	N/A	N/A	N/A	N/A	6	4	6	6	9	6	5
Selenium	1	1	2.9	2.9	<1	<1	<1	<1	<1	<1	<1
Silver	20	20	40	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	N/A	N/A	N/A	N/A	22	16	25	33	21	17	16
Thallium	1	1	1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	5	50	300	300	<2	<2	<2	<2	<2	<2	<2
Uranium	23	23	33	300	0.4	0.4	0.4	0.6	0.8	0.6	0.5
Vanadium	130	130	130	130	16	16	16	16	21	15	14
Zinc	200	200	360	360	27	25	26	27	33	24	24
Sodium Adsorption Ratio	5	5	12	12	N/A	2.3	1.2	N/A	N/A	0.056	0.21
Conductivity (µS/cm)	2000	2000	4000	4000	N/A	850	390	N/A	N/A	820	260
				Sample Depth (mbgs)	0.15	1.2	2.4	2.4	0.15	0.5	1.2
				Sample Date	17-Jul-14	7-Aug-14	7-Aug-14	7-Aug-14	17-Jul-14	7-Aug-14	7-Aug-14

Most current version of guidelines accessed August 2014

N/A = Not Applicable, no criteria developed

Table 3. Tignish Historical Dredge Disposal Area - SPLP Leachable Sodium and Leachable Chloride Concentrations in Soil

Parameters	Concentration (mg/L)								
	Regulated Limits	Sample ID							
		SS-01SC	SC-COMPA	SC-COMPB	SC-COMPB Lab-Dup	SS-01NC	SS-01NC Lab-Dup	NC-COMPA	NC-COMPB
Chloride	N/A	25	33	5	5	1	N/A	3	4
Sodium	N/A	23	26	7.9	8.2	2.1	1.9	2.9	2.4
Sample Depth (mbgs)		0.15	1.2	2.4	2.4	0.15	0.15	0.5	1.2
Sample Date		17-Jul-14	7-Aug-14	7-Aug-14	7-Aug-14	17-Jul-14	17-Jul-14	7-Aug-14	7-Aug-14

N/A = Not Applicable, no criteria developed

Table 4. Tignish Historical Dredge Disposal Area - Petroleum Hydrocarbon Concentrations in Soil

Sample ID	Sample Date	Sample Depth (mbgs)	BTEX Concentrations (mg/kg)				Petroleum Hydrocarbon Fraction Concentrations (mg/kg)				Resemblance
			Benzene	Toluene	Ethylbenzene	Xylenes	F1 (C6-C10)	F2 (>C10-C16)	F3 (>C16-C34)	Modified TPH (Less BTEX)	
SS-01SC	17-Jul-14	0.15	<0.03	<0.03	<0.03	<0.05	<3	<10	37	37	LO
SS-01SC Lab-Dup	17-Jul-14	0.15	<0.03	<0.03	<0.03	<0.05	<3	N/A	N/A	N/A	N/A
SC-COMPA	7-Aug-14	1.2	<0.03	<0.03	<0.03	<0.05	<3	14	130	140	OP.FO/LO
SC-COMPB	7-Aug-14	2.4	<0.03	<0.03	<0.03	<0.05	<3	<10	22	22	U.LO/PLO
SS-01NC	17-Jul-14	0.15	<0.03	<0.03	<0.03	<0.05	<3	<10	26	26	LO
NC-COMPA	7-Aug-14	0.5	<0.03	<0.03	<0.03	<0.05	<3	<10	26	26	U.LO
NC-COMPB	7-Aug-14	1.2	<0.03	<0.03	<0.03	<0.05	<3	<10	<20	<20	N/A
PROVINCIAL											
Lowest of Tier I RBSLs or ESLs for a Residential or Agricultural potable site with coarse grained soil.			0.042	0.35	0.065	8.8	210	150	300	74 / 270 / 1100	N/A
Lowest of Tier I RBSLs or ESLs for a Commercial or Industrial potable site with coarse grained soil.			0.042	0.35	0.065	11	320	260	1700	870 / 1800 / 10000	N/A

Provincial Guideline for Modified TPH is for gasoline / fuel oil / lube oil

Most current version of guideline accessed August 2014; LO - Lube Oil; PLO - Possible Lube Oil; FO - Fuel Oil; OP. - One Product; U. - Unidentified Compound

N/A = Not Applicable, no criteria developed

Table 5. Tignish Historical Dredge Disposal Area - PAH Concentrations in Soil

Parameter	B(a)P PEF	Concentration (mg/kg)							
		CCME Probable Effect Level for Sediment	CCME Ecological Guideline for Soil			CCME Human Health Guideline	Sample Identification		
			Agricultural	Residential / Parkland	Commercial & Industrial	Potable site, All Land Uses	Composite SS-01SC	SC-COMPA	SC-COMPB
Non-Carcinogenic PAHs									
Acenaphthene	-		-	-	-	-	<0.01	0.15	<0.01
Acenaphthylene	-		-	-	-	-	<0.01	<0.01	<0.01
Anthracene	-		2.5	2.5	32	-	<0.01	0.13	<0.01
Fluoranthene	-		50	50	180	-	0.06	0.53	0.03
Fluorene	-		-	-	-	-	<0.01	0.15	<0.01
Naphthalene	-	0.346	0.013	0.013	0.013	-	<0.01	**0.02**	<0.01
Perylene	-		-	-	-	-	0.02	0.02	<0.01
Phenanthrene	-	0.419	0.046	0.046	0.046	-	<0.01	**0.38**	<0.01
Pyrene	-		0.1	10	100	-	0.04	**0.31**	0.02
Carcinogenic PAHs									
Benzo[a]anthracene	0.1		0.1	1	10	-	0.03	0.09	0.01
Benzo[a]pyrene	1		20	20	72	-	0.03	0.04	<0.01
Benzo[b]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	0.04	0.05	0.01
Benzo[ghi]perylene	0.01		-	-	-	-	0.02	0.02	<0.01
Benzo[j]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	0.02	0.03	<0.01
Benzo[k]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	0.02	0.02	<0.01
Chrysene	0.01		-	-	-	-	0.04	0.08	0.02
Dibenz[a,h]anthracene	1		0.1	1	10	-	<0.01	<0.01	<0.01
Indeno[1,2,3-cd]pyrene	0.1		0.1	1	10	-	0.02	0.02	<0.01
Index of Additive Cancer Risk (IACR)*	-		-	-	-	1	0.14	0.21	0.04
B(a)P TPE	-		-	-	-	5.3	0.15 [1]	0.2 [1]	0.04 [1]
						Sample Depth (mbgs)	0.15	1.2	2.4
						Sample Date	17-Jul-14	7-Aug-14	7-Aug-14

Most current version of guidelines accessed August 2014

[1] Uncertainty factor of 3 was used as the PAH source is expected to be creosote.

[2] Guideline is for the sum of Benzo [b+j+k]fluoranthene

If the concentration was less than the detection limit, then 1/2 the detection limit was used in B(a)P TPE calculations.

' -" = no guideline available

Bold and underlined - exceeds CCME ecological guidelines.

*IACR was modified using the Atlantic PIRI approach for adjusting the well dilution factor (section 3.3.9 of the Atlantic PIRI User Guide)

Table 5. Tignish Historical Dredge Disposal Area - PAH Concentrations in Soil

Parameter	B(a)P PEF	Concentration (mg/kg)								
		CCME Probable Effect Level for Sediment	CCME Ecological Guideline for Soil			CCME Human Health Guideline	Sample Identification			
			Agricultural	Residential / Parkland	Commercial & Industrial	Potable site, All Land Uses	Composite SS-01NC	NC-COMPA	NC-COMPA Lab-Dup	NC-COMPB
Non-Carcinogenic PAHs										
Acenaphthene	-		-	-	-	-	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	-		-	-	-	-	<0.01	<0.01	<0.01	<0.01
Anthracene	-		2.5	2.5	32	-	<0.01	0.02	<0.01	<0.01
Fluoranthene	-		50	50	180	-	<0.01	0.05	0.03	0.04
Fluorene	-		-	-	-	-	<0.01	<0.01	<0.01	<0.01
Naphthalene	-	0.346	0.013	0.013	0.013	-	<0.01	<0.01	<0.01	<0.01
Perylene	-		-	-	-	-	<0.01	0.01	0.03	<0.01
Phenanthrene	-	0.419	0.046	0.046	0.046	-	<0.01	0.01	<0.01	<0.01
Pyrene	-		0.1	10	100	-	<0.01	0.04	0.03	0.03
Carcinogenic PAHs										
Benzo[a]anthracene	0.1		0.1	1	10	-	<0.01	0.04	**0.12**	<0.01
Benzo[a]pyrene	1		20	20	72	-	<0.01	0.01	0.10	<0.01
Benzo[b]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	0.02	0.02	**0.11**	<0.01
Benzo[ghi]perylene	0.01		-	-	-	-	<0.01	<0.01	0.04	<0.01
Benzo[j]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	<0.01	<0.01	0.07	<0.01
Benzo[k]fluoranthene	0.1		0.1 [2]	1 [2]	10 [2]	-	<0.01	<0.01	0.06	<0.01
Chrysene	0.01		-	-	-	-	<0.01	0.11	0.07	<0.01
Dibenz[a,h]anthracene	1		0.1	1	10	-	<0.01	<0.01	0.01	<0.01
Indeno[1,2,3-cd]pyrene	0.1		0.1	1	10	-	<0.01	<0.01	0.04	<0.01
Index of Additive Cancer Risk (IACR)*	-		-	-	-	1	0.05	0.08	0.43	0.03
B(a)P TPE	-		-	-	-	5.3	0.04 [1]	0.07 [1]	0.45 [1]	0.04 [1]
						Sample Depth (mbgs)	0.15	0.5	0.5	1.2
						Sample Date	17-Jul-14	7-Aug-14	7-Aug-14	7-Aug-14

Most current version of guidelines accessed August 2014

[1] Uncertainty factor of 3 was used as the PAH source is expected to be creosote.

[2] Guideline is for the sum of Benzo [b+j+k]fluoranthene

If the concentration was less than the detection limit, then 1/2 the detection limit was used in B(a)P TPE calculations.

' -" = no guideline available

Bold and underlined - exceeds CCME ecological guidelines.

*IACR was modified using the Atlantic PIRI approach for adjusting the well dilution factor (section 3.3.9 of the Atlantic PIRI User Guide)

Table 6. Tignish Historical Dredge Disposal Area - PCB Concentrations in Soil

Sample ID	Sample Date	Sample Depth (m)	Total PCB Concentration (mg/kg)
SS-01SC	17-Jul-14	0.15	<0.015
SS-01NC	17-Jul-14	0.15	<0.015
CCME Commercial/Industrial SQG			33
CCME Residential/Parkland SQG			1.3
CCME Agricultural SQG			0.5
Most current version of guidelines accessed August 2014			

Table 7. Tignish Historical Dredge Disposal Area - Total DDT Concentration in Soil

Sample ID	Sampling Date	Total DDT Concentration (mg/kg)
Composite SS-01SC	17-Jul-14	<0.0020
Composite SS-01NC	17-Jul-14	<0.0020
CCME SQG Residential or Agricultural Land Use		0.7
CCME SQG Commercial or Industrial Land Use		12
Notes:		
Most Current Version of Guidelines Accessed August 2014		

Table 8. Tignish Historical Dredge Disposal Area - Grain Size Analytical Results in Soil

Parameter	Units	Sample Identification and Date	
		SS-01SC	SS-01NC
		17-Jul-14	17-Jul-14
Grain Size Results			
< PHI -1 (2 mm)	%	100	100
< PHI 0 (1 mm)		99	100
< PHI +1 (0.5 mm)		98	98
< PHI +2 (0.25 mm)		77	87
< PHI +3 (0.12 mm)		38	49
< PHI +4 (0.062 mm)		30	34
< PHI +5 (0.031 mm)		26	29
< PHI +6 (0.016 mm)		21	21
< PHI +7 (0.0078 mm)		14	15
< PHI +8 (0.0039 mm)		11	11
< PHI +9 (0.0020 mm)		6.5	5.3
Gravel		0.2	<0.1
Sand		70	66
Silt		18	23
Clay		11	11
Other			
Moisture	%	16	23

Notes:

"-" = not analyzed

ATTACHMENT C
LABORATORY CERTIFICATES

Maxxam

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Your P.O. #: 16400NR
Your Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your C.O.C. #: ES879214

Attention: CLAYTON BARCLAY
Stantec Consulting Ltd
Fredericton - Standing Offer
845 Prospect Street
Fredericton, NB
E3B 2T7

Report Date: 2014/07/29
Report #: R3105324
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4C8459
Received: 2014/07/22, 09:12

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Chloride	2	N/A	2014/07/29	ATL SOP 00014	SM 22 4500-Cl- E m
Hexavalent Chromium in Soil by IC (1,2)	2	2014/07/25	2014/07/28	CAM SOP-00436	EPA 3060/7199 m
TEH in Soil (PIRI) (2)	2	2014/07/22	2014/07/23	ATL SOP 00111	Atl. PIRI v3 m
Metals Leach, SPLP Extraction	2	2014/07/25	2014/07/26	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	2	2014/07/23	2014/07/25	ATL SOP 00058	EPA 6020A R1 m
Moisture	2	N/A	2014/07/23	ATL SOP 00001	OMOE Handbook 1983 m
OC Pesticides (Selected) & PCB (1,3)	2	2014/07/24	2014/07/25	CAM SOP-00307	SW846 8081, 8082
OC Pesticides Summed Parameters (1)	2	N/A	2014/07/23	CAM SOP-00307	EPA 8081/8082 m
PAH Compounds by GCMS (SIM) (2)	2	2014/07/22	2014/07/23	ATL SOP 00102	EPA 8270D m
VPH in Soil (PIRI)	2	2014/07/22	2014/07/24	ATL SOP 00119	Atl. PIRI v3 m
Particle size in solids (pipette&sieve) (4)	2	N/A	2014/07/28	ATL SOP 00012	MSAMS 1978 m
SPLP Inorganic extraction - pH	2	N/A	2014/07/23	ATL SOP 00036	EPA 1312 m
SPLP Inorganic extraction - Weight	2	N/A	2014/07/23	ATL SOP 00036	EPA 1312 m
ModTPH (T1) Calc. for Soil (5)	1	N/A	2014/07/25	N/A	Atl. PIRI v3 m
ModTPH (T1) Calc. for Soil (5)	1	N/A	2014/07/28	N/A	Atl. PIRI v3 m

Remarks:

Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.
(3) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(4) Note: Graphical representation of larger fractions (PHI-4, PHI -3 and PHI -2) not applicable unless these optional parameters are specifically requested.
(5) New RDLs in effect due to release of NS Contaminated Sites Regulations. Reduced RDL based on MDL study performance. Low level analytical run checks being implemented.

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Maxxam Job #: B4C8459
Report Date: 2014/07/29

Stantec Consulting Ltd
Client Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your P.O. #: 16400NR
Sampler Initials: RM

Encryption Key

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

Leonard Muise, Project Manager
Email: LMuise@maxxam.ca
Phone# (902) 420-0203 Ext:236

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

Total cover pages: 2

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Your P.O. #: 16400NR
Sampler Initials: RM

RESULTS OF ANALYSES OF SOIL

Maxxam ID		WT9286	WT9287	WT9287		
Sampling Date		2014/07/17	2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**SS-01NC Lab-Dup**	**RDL**	**QC Batch**
Charge/Prep Analysis						
Sample Weight (as received)	g	50	50	50	N/A	3685521
Final pH	N/A	8.16	7.94	8.05	N/A	3685523
Inorganics						
Dissolved Chloride (Cl)	mg/L	25	1	<1	1	3692322
Chromium (VI)	ug/g	<0.2	<0.2		0.2	3688822
Moisture	%	16	23		1	3683816
< -1 Phi (2 mm)	%	100	100		0.1	3684215
< 0 Phi (1 mm)	%	99	100		0.1	3684215
< +1 Phi (0.5 mm)	%	98	98		0.1	3684215
< +2 Phi (0.25 mm)	%	77	87		0.1	3684215
< +3 Phi (0.12 mm)	%	38	49		0.1	3684215
< +4 Phi (0.062 mm)	%	30	34		0.1	3684215
< +5 Phi (0.031 mm)	%	26	29		0.1	3684215
< +6 Phi (0.016 mm)	%	21	21		0.1	3684215
< +7 Phi (0.0078 mm)	%	14	15		0.1	3684215
< +8 Phi (0.0039 mm)	%	11	11		0.1	3684215
< +9 Phi (0.0020 mm)	%	6.5	5.3		0.1	3684215
Gravel	%	0.2	<0.1		0.1	3684215
Sand	%	70	66		0.1	3684215
Silt	%	18	23		0.1	3684215
Clay	%	11	11		0.1	3684215

ELEMENTS BY ICP/MS (SOIL)

Maxxam ID		WT9286	WT9287	WT9287		
Sampling Date		2014/07/17	2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**SS-01NC Lab-Dup**	**RDL**	**QC Batch**
Metals						
Leachable Sodium (Na)	ug/L	23000	2100	1900	100	3689074

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: RM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		WT9286	WT9287		
Sampling Date		2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**RDL**	**QC Batch**
Metals					
Acid Extractable Aluminum (Al)	mg/kg	5100	7200	10	3687304
Acid Extractable Antimony (Sb)	mg/kg	<2	<2	2	3687304
Acid Extractable Arsenic (As)	mg/kg	2	3	2	3687304
Acid Extractable Barium (Ba)	mg/kg	21	22	5	3687304
Acid Extractable Beryllium (Be)	mg/kg	<2	<2	2	3687304
Acid Extractable Bismuth (Bi)	mg/kg	<2	<2	2	3687304
Acid Extractable Boron (B)	mg/kg	<50	<50	50	3687304
Acid Extractable Cadmium (Cd)	mg/kg	<0.3	<0.3	0.3	3687304
Acid Extractable Chromium (Cr)	mg/kg	10	15	2	3687304
Acid Extractable Cobalt (Co)	mg/kg	4	6	1	3687304
Acid Extractable Copper (Cu)	mg/kg	6	8	2	3687304
Acid Extractable Iron (Fe)	mg/kg	11000	15000	50	3687304
Acid Extractable Lead (Pb)	mg/kg	4.9	6.0	0.5	3687304
Acid Extractable Lithium (Li)	mg/kg	13	20	2	3687304
Acid Extractable Manganese (Mn)	mg/kg	230	280	2	3687304
Acid Extractable Mercury (Hg)	mg/kg	<0.1	<0.1	0.1	3687304
Acid Extractable Molybdenum (Mo)	mg/kg	<2	<2	2	3687304
Acid Extractable Nickel (Ni)	mg/kg	10	15	2	3687304
Acid Extractable Rubidium (Rb)	mg/kg	6	9	2	3687304
Acid Extractable Selenium (Se)	mg/kg	<1	<1	1	3687304
Acid Extractable Silver (Ag)	mg/kg	<0.5	<0.5	0.5	3687304
Acid Extractable Strontium (Sr)	mg/kg	22	21	5	3687304
Acid Extractable Thallium (Tl)	mg/kg	<0.1	<0.1	0.1	3687304
Acid Extractable Tin (Sn)	mg/kg	<2	<2	2	3687304
Acid Extractable Uranium (U)	mg/kg	0.4	0.8	0.1	3687304
Acid Extractable Vanadium (V)	mg/kg	16	21	2	3687304
Acid Extractable Zinc (Zn)	mg/kg	27	33	5	3687304

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: RM

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		WT9286	WT9287		
Sampling Date		2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	mg/kg	<0.01	<0.01	0.01	3683738
2-Methylnaphthalene	mg/kg	<0.01	<0.01	0.01	3683738
Acenaphthene	mg/kg	<0.01	<0.01	0.01	3683738
Acenaphthylene	mg/kg	<0.01	<0.01	0.01	3683738
Anthracene	mg/kg	<0.01	<0.01	0.01	3683738
Benzo(a)anthracene	mg/kg	0.03	<0.01	0.01	3683738
Benzo(a)pyrene	mg/kg	0.03	<0.01	0.01	3683738
Benzo(b)fluoranthene	mg/kg	0.04	0.02	0.01	3683738
Benzo(g,h,i)perylene	mg/kg	0.02	<0.01	0.01	3683738
Benzo(j)fluoranthene	mg/kg	0.02	<0.01	0.01	3683738
Benzo(k)fluoranthene	mg/kg	0.02	<0.01	0.01	3683738
Chrysene	mg/kg	0.04	<0.01	0.01	3683738
Dibenz(a,h)anthracene	mg/kg	<0.01	<0.01	0.01	3683738
Fluoranthene	mg/kg	0.06	<0.01	0.01	3683738
Fluorene	mg/kg	<0.01	<0.01	0.01	3683738
Indeno(1,2,3-cd)pyrene	mg/kg	0.02	<0.01	0.01	3683738
Naphthalene	mg/kg	<0.01	<0.01	0.01	3683738
Perylene	mg/kg	0.02	<0.01	0.01	3683738
Phenanthrene	mg/kg	<0.01	<0.01	0.01	3683738
Pyrene	mg/kg	0.04	<0.01	0.01	3683738
Surrogate Recovery (%)					
D10-Anthracene	%	89	84		3683738
D14-Terphenyl (FS)	%	94	92		3683738
D8-Acenaphthylene	%	91	85		3683738

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Client Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your P.O. #: 16400NR
Sampler Initials: RM

ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		WT9286	WT9286	WT9287		
Sampling Date		2014/07/17	2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01SC Lab-Dup**	**SS-01NC**	**RDL**	**QC Batch**
Petroleum Hydrocarbons						
Benzene	mg/kg	<0.03	<0.03	<0.03	0.03	3687093
Toluene	mg/kg	<0.03	<0.03	<0.03	0.03	3687093
Ethylbenzene	mg/kg	<0.03	<0.03	<0.03	0.03	3687093
Xylene (Total)	mg/kg	<0.05	<0.05	<0.05	0.05	3687093
C6 - C10 (less BTEX)	mg/kg	<3	<3	<3	3	3687093
>C10-C16 Hydrocarbons	mg/kg	<10		<10	10	3684344
>C16-C21 Hydrocarbons	mg/kg	<10		<10	10	3684344
>C21-<C32 Hydrocarbons	mg/kg	37		26	20	3684344
Modified TPH (Tier1)	mg/kg	37		26	20	3683837
Reached Baseline at C32	mg/kg	YES		YES	N/A	3684344
Hydrocarbon Resemblance	mg/kg	COMMENT(1)		COMMENT(1)	N/A	3684344
Surrogate Recovery (%)						
Isobutylbenzene - Extractable	%	90		89		3684344
Isobutylbenzene - Volatile	%	108	106	106		3687093
n-Dotriacontane - Extractable	%	111		98		3684344

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Lube oil fraction.

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Maxxam Job #: B4C8459
Report Date: 2014/07/29

Stantec Consulting Ltd
Client Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your P.O. #: 16400NR
Sampler Initials: RM

ORGANOCHLORINATED PESTICIDES BY GC-ECD (SOIL)

Maxxam ID		WT9286	WT9287		
Sampling Date		2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**RDL**	**QC Batch**
Calculated Parameters					
Aldrin + Dieldrin	ug/g	<0.0020	<0.0020	0.0020	3684038
Chlordane (Total)	ug/g	<0.0020	<0.0020	0.0020	3684038
DDT+ Metabolites	ug/g	<0.0020	<0.0020	0.0020	3684038
Heptachlor + Heptachlor epoxide	ug/g	<0.0020	<0.0020	0.0020	3684038
o,p-DDD + p,p-DDD	ug/g	<0.0020	<0.0020	0.0020	3684038
o,p-DDE + p,p-DDE	ug/g	<0.0020	<0.0020	0.0020	3684038
o,p-DDT + p,p-DDT	ug/g	<0.0020	<0.0020	0.0020	3684038
Total Endosulfan	ug/g	<0.0020	<0.0020	0.0020	3684038
Total PCB	ug/g	<0.015	<0.015	0.015	3684038
Pesticides & Herbicides					
Aldrin	ug/g	<0.0020	<0.0020	0.0020	3687830
a-Chlordane	ug/g	<0.0020	<0.0020	0.0020	3687830
g-Chlordane	ug/g	<0.0020	<0.0020	0.0020	3687830
o,p-DDD	ug/g	<0.0020	<0.0020	0.0020	3687830
p,p-DDD	ug/g	<0.0020	<0.0020	0.0020	3687830
o,p-DDE	ug/g	<0.0020	<0.0020	0.0020	3687830
p,p-DDE	ug/g	<0.0020	<0.0020	0.0020	3687830
o,p-DDT	ug/g	<0.0020	<0.0020	0.0020	3687830
p,p-DDT	ug/g	<0.0020	<0.0020	0.0020	3687830
Dieldrin	ug/g	<0.0020	<0.0020	0.0020	3687830
Lindane	ug/g	<0.0020	<0.0020	0.0020	3687830
Endosulfan I (alpha)	ug/g	<0.0020	<0.0020	0.0020	3687830
Endosulfan II	ug/g	<0.0020	<0.0020	0.0020	3687830
Endrin	ug/g	<0.0020	<0.0020	0.0020	3687830
Heptachlor	ug/g	<0.0020	<0.0020	0.0020	3687830
Heptachlor epoxide	ug/g	<0.0020	<0.0020	0.0020	3687830
Hexachlorobenzene	ug/g	<0.0020	<0.0020	0.0020	3687830
Methoxychlor	ug/g	<0.0050	<0.0050	0.0050	3687830
Aroclor 1016	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1221	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1232	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1242	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1248	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1254	ug/g	<0.015	<0.015	0.015	3687830

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4C8459
Report Date: 2014/07/29

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Client Project #: 121811228
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Sampler Initials: RM

ORGANOCHLORINATED PESTICIDES BY GC-ECD (SOIL)

Maxxam ID		WT9286	WT9287		
Sampling Date		2014/07/17	2014/07/17		
	Units	**SS-01SC**	**SS-01NC**	**RDL**	**QC Batch**
Aroclor 1260	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1262	ug/g	<0.015	<0.015	0.015	3687830
Aroclor 1268	ug/g	<0.015	<0.015	0.015	3687830
alpha-BHC	ug/g	<0.0020	<0.0020	0.0020	3687830
beta-BHC	ug/g	<0.0020	<0.0020	0.0020	3687830
delta-BHC	ug/g	<0.0020	<0.0020	0.0020	3687830
Endosulfan sulfate	ug/g	<0.0020	<0.0020	0.0020	3687830
Endrin aldehyde	ug/g	<0.0020	<0.0020	0.0020	3687830
Endrin ketone	ug/g	<0.0020	<0.0020	0.0020	3687830
Mirex	ug/g	<0.0020	<0.0020	0.0020	3687830
Octachlorostyrene	ug/g	<0.0020	<0.0020	0.0020	3687830
Toxaphene	ug/g	<0.080	<0.080	0.080	3687830
Surrogate Recovery (%)					
2,4,5,6-Tetrachloro-m-xylene	%	78	85		3687830
Decachlorobiphenyl	%	106	105		3687830

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4C8459
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Package 1	3.7°C
Package 2	3.3°C

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

GENERAL COMMENTS

Maxxam Analytics International Corporation o/a Maxxam Analytics 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel:902-420-0203 Toll-free:800-565-7227 Fax:902-420-8612 www.maxxamanalytics.com

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Success Through Science®

Maxxam Job #: B4C8459
Report Date: 2014/07/29

Stantec Consulting Ltd
Client Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your P.O. #: 16400NR
Sampler Initials: RM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3683738	D10-Anthracene	2014/07/22	100	30 - 130	85	30 - 130	85	%				
3683738	D14-Terphenyl (FS)	2014/07/22	111	30 - 130	92	30 - 130	95	%				
3683738	D8-Acenaphthylene	2014/07/22	111	30 - 130	86	30 - 130	84	%				
3683738	1-Methylnaphthalene	2014/07/22	88	30 - 130	71	30 - 130	<0.01	mg/kg	NC	50		
3683738	2-Methylnaphthalene	2014/07/22	98	30 - 130	79	30 - 130	<0.01	mg/kg	NC	50		
3683738	Acenaphthene	2014/07/22	98	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3683738	Acenaphthylene	2014/07/22	101	30 - 130	80	30 - 130	<0.01	mg/kg	NC	50		
3683738	Anthracene	2014/07/22	96	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3683738	Benzo(a)anthracene	2014/07/22	111	30 - 130	87	30 - 130	<0.01	mg/kg	47.6	50		
3683738	Benzo(a)pyrene	2014/07/22	89	30 - 130	88	30 - 130	<0.01	mg/kg	NC(1)	50		
3683738	Benzo(b)fluoranthene	2014/07/22	84	30 - 130	89	30 - 130	<0.01	mg/kg	NC	50		
3683738	Benzo(g,h,i)perylene	2014/07/22	82	30 - 130	85	30 - 130	<0.01	mg/kg	NC	50		
3683738	Benzo(j)fluoranthene	2014/07/22	86	30 - 130	83	30 - 130	<0.01	mg/kg	NC	50		
3683738	Benzo(k)fluoranthene	2014/07/22	90	30 - 130	86	30 - 130	<0.01	mg/kg	NC	50		
3683738	Chrysene	2014/07/22	104	30 - 130	90	30 - 130	<0.01	mg/kg	49.9	50		
3683738	Dibenz(a,h)anthracene	2014/07/22	92	30 - 130	91	30 - 130	<0.01	mg/kg	NC	50		
3683738	Fluoranthene	2014/07/22	90	30 - 130	84	30 - 130	<0.01	mg/kg	53.5(2, 3)	50		
3683738	Fluorene	2014/07/22	96	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3683738	Indeno(1,2,3-cd)pyrene	2014/07/22	86	30 - 130	85	30 - 130	<0.01	mg/kg	NC	50		
3683738	Naphthalene	2014/07/22	97	30 - 130	73	30 - 130	<0.01	mg/kg	NC	50		
3683738	Perylene	2014/07/22	82	30 - 130	86	30 - 130	<0.01	mg/kg	23.4	50		
3683738	Phenanthrene	2014/07/22	85	30 - 130	77	30 - 130	<0.01	mg/kg	NC	50		
3683738	Pyrene	2014/07/22	92	30 - 130	82	30 - 130	<0.01	mg/kg	49.8	50		
3684215	Gravel	2014/07/28							112(2, 4)	35		
3684215	Sand	2014/07/28							24.5	35		
3684215	Silt	2014/07/28							7.4	35		
3684215	Clay	2014/07/28							33.9	35		
3684344	Isobutylbenzene - Extractable	2014/07/22	88	30 - 130	90	30 - 130	91	%				
3684344	n-Dotriacontane - Extractable	2014/07/22	109	30 - 130	112	30 - 130	114	%				
3684344	>C10-C16 Hydrocarbons	2014/07/22	70	30 - 130	70	30 - 130	<10	mg/kg	NC	50		
3684344	>C16-C21 Hydrocarbons	2014/07/22	80	30 - 130	80	30 - 130	<10	mg/kg	NC	50		
3684344	>C21-<C32 Hydrocarbons	2014/07/22	79	30 - 130	82	30 - 130	<20	mg/kg	NC	50		
3685521	Sample Weight (as received)	2014/07/23					NA, RDL=N/A	g	0	N/A		
3685523	Final pH	2014/07/23					4.18, RDL=N/A	N/A	1.4	N/A		
3687093	Isobutylbenzene - Volatile	2014/07/24	100	60 - 140	98	60 - 140	99	%				
3687093	Benzene	2014/07/24	105	60 - 140	100	60 - 140	<0.03	mg/kg	NC	50		
3687093	Toluene	2014/07/24	145(2, 5)	60 - 140	100	60 - 140	<0.03	mg/kg	NC	50		
3687093	Ethylbenzene	2014/07/24	130	60 - 140	110	60 - 140	<0.03	mg/kg	NC	50		
3687093	Xylene (Total)	2014/07/24	145(2, 5)	60 - 140	107	60 - 140	<0.05	mg/kg	NC	50		

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Report Date: 2014/07/29

Stantec Consulting Ltd
Client Project #: 121811228
Site Location: TIGNISH JUDES POINT
Your P.O. #: 16400NR
Sampler Initials: RM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3687093	C6 - C10 (less BTEX)	2014/07/24					<3	mg/kg	NC	50		
3687304	Acid Extractable Antimony (Sb)	2014/07/25	80	75 - 125	103	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Arsenic (As)	2014/07/25	101	75 - 125	101	75 - 125	<2	mg/kg	4.7	35		
3687304	Acid Extractable Barium (Ba)	2014/07/25	NC	75 - 125	101	75 - 125	<5	mg/kg	11.5	35		
3687304	Acid Extractable Beryllium (Be)	2014/07/25	103	75 - 125	102	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Bismuth (Bi)	2014/07/25	103	75 - 125	101	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Boron (B)	2014/07/25	96	75 - 125	101	75 - 125	<50	mg/kg	NC	35		
3687304	Acid Extractable Cadmium (Cd)	2014/07/25	101	75 - 125	100	75 - 125	<0.3	mg/kg	NC	35		
3687304	Acid Extractable Chromium (Cr)	2014/07/25	NC	75 - 125	97	75 - 125	<2	mg/kg	11.0	35		
3687304	Acid Extractable Cobalt (Co)	2014/07/25	96	75 - 125	96	75 - 125	<1	mg/kg	16.5	35		
3687304	Acid Extractable Copper (Cu)	2014/07/25	NC	75 - 125	98	75 - 125	<2	mg/kg	4.1	35		
3687304	Acid Extractable Lead (Pb)	2014/07/25	NC	75 - 125	98	75 - 125	<0.5	mg/kg	0.3	35		
3687304	Acid Extractable Lithium (Li)	2014/07/25	108	75 - 125	105	75 - 125	<2	mg/kg	2.2	35		
3687304	Acid Extractable Manganese (Mn)	2014/07/25	NC	75 - 125	100	75 - 125	<2	mg/kg	0.5	35		
3687304	Acid Extractable Mercury (Hg)	2014/07/25	93	75 - 125	93	75 - 125	<0.1	mg/kg	NC	35		
3687304	Acid Extractable Molybdenum (Mo)	2014/07/25	103	75 - 125	100	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Nickel (Ni)	2014/07/25	99	75 - 125	99	75 - 125	<2	mg/kg	10.6	35		
3687304	Acid Extractable Rubidium (Rb)	2014/07/25	98	75 - 125	100	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Selenium (Se)	2014/07/25	100	75 - 125	101	75 - 125	<1	mg/kg	NC	35		
3687304	Acid Extractable Silver (Ag)	2014/07/25	100	75 - 125	100	75 - 125	<0.5	mg/kg	NC	35		
3687304	Acid Extractable Strontium (Sr)	2014/07/25	99	75 - 125	99	75 - 125	<5	mg/kg	NC	35		
3687304	Acid Extractable Thallium (Tl)	2014/07/25	98	75 - 125	98	75 - 125	<0.1	mg/kg	NC	35		
3687304	Acid Extractable Tin (Sn)	2014/07/25	117	75 - 125	103	75 - 125	<2	mg/kg	NC	35		
3687304	Acid Extractable Uranium (U)	2014/07/25	99	75 - 125	99	75 - 125	<0.1	mg/kg	2.2	35		
3687304	Acid Extractable Vanadium (V)	2014/07/25	NC	75 - 125	96	75 - 125	<2	mg/kg	6.3	35		
3687304	Acid Extractable Zinc (Zn)	2014/07/25	NC	75 - 125	100	75 - 125	<5	mg/kg	37.3(2, 6)	35		
3687304	Acid Extractable Aluminum (Al)	2014/07/25					<10	mg/kg	3.4	35		
3687304	Acid Extractable Iron (Fe)	2014/07/25					<50	mg/kg	4.2	35		
3687830	2,4,5,6-Tetrachloro-m-xylene	2014/07/25	87	50 - 130	84	50 - 130	82	%				
3687830	Decachlorobiphenyl	2014/07/25	118	50 - 130	110	50 - 130	115	%				
3687830	Aldrin	2014/07/25	86	50 - 130	84	50 - 130	<0.0020	ug/g	NC	40		
3687830	a-Chlordane	2014/07/25	99	50 - 130	97	50 - 130	<0.0020	ug/g	NC	40		
3687830	g-Chlordane	2014/07/25	105	50 - 130	100	50 - 130	<0.0020	ug/g	NC	40		
3687830	o,p-DDD	2014/07/25	113	50 - 130	108	50 - 130	<0.0020	ug/g	NC	40		
3687830	p,p-DDD	2014/07/25	110	50 - 130	106	50 - 130	<0.0020	ug/g	NC	40		
3687830	o,p-DDE	2014/07/25	97	50 - 130	95	50 - 130	<0.0020	ug/g	NC	40		
3687830	p,p-DDE	2014/07/25	102	50 - 130	150(2, 7)	50 - 130	<0.0020	ug/g	NC	40		
3687830	o,p-DDT	2014/07/25	96	50 - 130	91	50 - 130	<0.0020	ug/g	NC	40		
3687830	p,p-DDT	2014/07/25	91	50 - 130	86	50 - 130	<0.0020	ug/g	NC	40		

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3687830	Dieldrin	2014/07/25	102	50 - 130	97	50 - 130	<0.0020	ug/g	NC	40		
3687830	Lindane	2014/07/25	92	50 - 130	89	50 - 130	<0.0020	ug/g	NC	40		
3687830	Endosulfan I (alpha)	2014/07/25	72	50 - 130	70	50 - 130	<0.0020	ug/g	NC	40		
3687830	Endosulfan II	2014/07/25	87	50 - 130	84	50 - 130	<0.0020	ug/g	NC	40		
3687830	Endrin	2014/07/25	83	50 - 130	78	50 - 130	<0.0020	ug/g	NC	40		
3687830	Heptachlor	2014/07/25	88	50 - 130	86	50 - 130	<0.0020	ug/g	NC	40		
3687830	Heptachlor epoxide	2014/07/25	89	50 - 130	86	50 - 130	<0.0020	ug/g	NC	40		
3687830	Hexachlorobenzene	2014/07/25	95	50 - 130	95	50 - 130	<0.0020	ug/g	NC	40		
3687830	Methoxychlor	2014/07/25	92	50 - 130	82	50 - 130	<0.0050	ug/g	NC	40		
3687830	alpha-BHC	2014/07/25	89	30 - 130	84	30 - 130	<0.0020	ug/g				
3687830	beta-BHC	2014/07/25	91	30 - 130	83	30 - 130	<0.0020	ug/g				
3687830	delta-BHC	2014/07/25	82	30 - 130	78	30 - 130	<0.0020	ug/g				
3687830	Endosulfan sulfate	2014/07/25	88	30 - 130	83	30 - 130	<0.0020	ug/g				
3687830	Endrin aldehyde	2014/07/25	118	30 - 130	73	30 - 130	<0.0020	ug/g				
3687830	Endrin ketone	2014/07/25	114	30 - 130	90	30 - 130	<0.0020	ug/g				
3687830	Mirex	2014/07/25	106	30 - 130	101	30 - 130	<0.0020	ug/g				
3687830	Octachlorostyrene	2014/07/25	93	30 - 130	94	30 - 130	<0.0020	ug/g				
3687830	Aroclor 1242	2014/07/25					<0.015	ug/g	NC	40		
3687830	Toxaphene	2014/07/25					<0.080	ug/g	NC	50		
3687830	Aroclor 1016	2014/07/25					<0.015	ug/g				
3687830	Aroclor 1221	2014/07/25					<0.015	ug/g				
3687830	Aroclor 1232	2014/07/25					<0.015	ug/g				
3687830	Aroclor 1248	2014/07/25					<0.015	ug/g	NC	40		
3687830	Aroclor 1254	2014/07/25					<0.015	ug/g	NC	40		
3687830	Aroclor 1260	2014/07/25					<0.015	ug/g	NC	40		
3687830	Aroclor 1262	2014/07/25					<0.015	ug/g				
3687830	Aroclor 1268	2014/07/25					<0.015	ug/g				
3688822	Chromium (VI)	2014/07/28	47 (2, 8)	75 - 125	94	80 - 120	<0.2	ug/g	NC	35	101	80 - 120

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3689074	Leachable Sodium (Na)	2014/07/26	97	80 - 120	95	80 - 120	1400, RDL=100(9)	ug/L	11.7	35		
3692322	Dissolved Chloride (Cl)	2014/07/29	99	80 - 120			<1	mg/L	NC	25		

N/A = Not Applicable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).
(1) - Elevated PAH RDL(s) due to matrix / co-extractive interference.
(2) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(3) - Duplicate: < 10 % of compounds in multi-component analysis in violation.
(4) - PSA: Poor duplicate agreemnet due to sample inhomogeneity
(5) - Matrix Spike: results are outside acceptance limit. Analysis was repeated with similar results.
(6) - Poor RPD due to sample inhomogeneity. < 10 % of compounds in multi-component analysis in violation.
(7) - The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.
(8) - The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The matrix spike was reanalyzed to confirm result.
(9) - Detectable concentration in the blank leachate typical for matrix.

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Validation Signature Page

Maxxam Job #: B4C8459

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

Alan Stewart, Scientific Specialist (Organics)

Brad Newman, Scientific Specialist

Kevin MacDonald, Inorganics Supervisor

Mike MacGillivray, Scientific Specialist (Inorganics)

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Validation Signature Page

Maxxam Job #: B4C8459

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

Rosemary MacDonald, Scientific Specialist (Organics)

==========

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

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Maxxam ID: WT9286-01

SS-01SC

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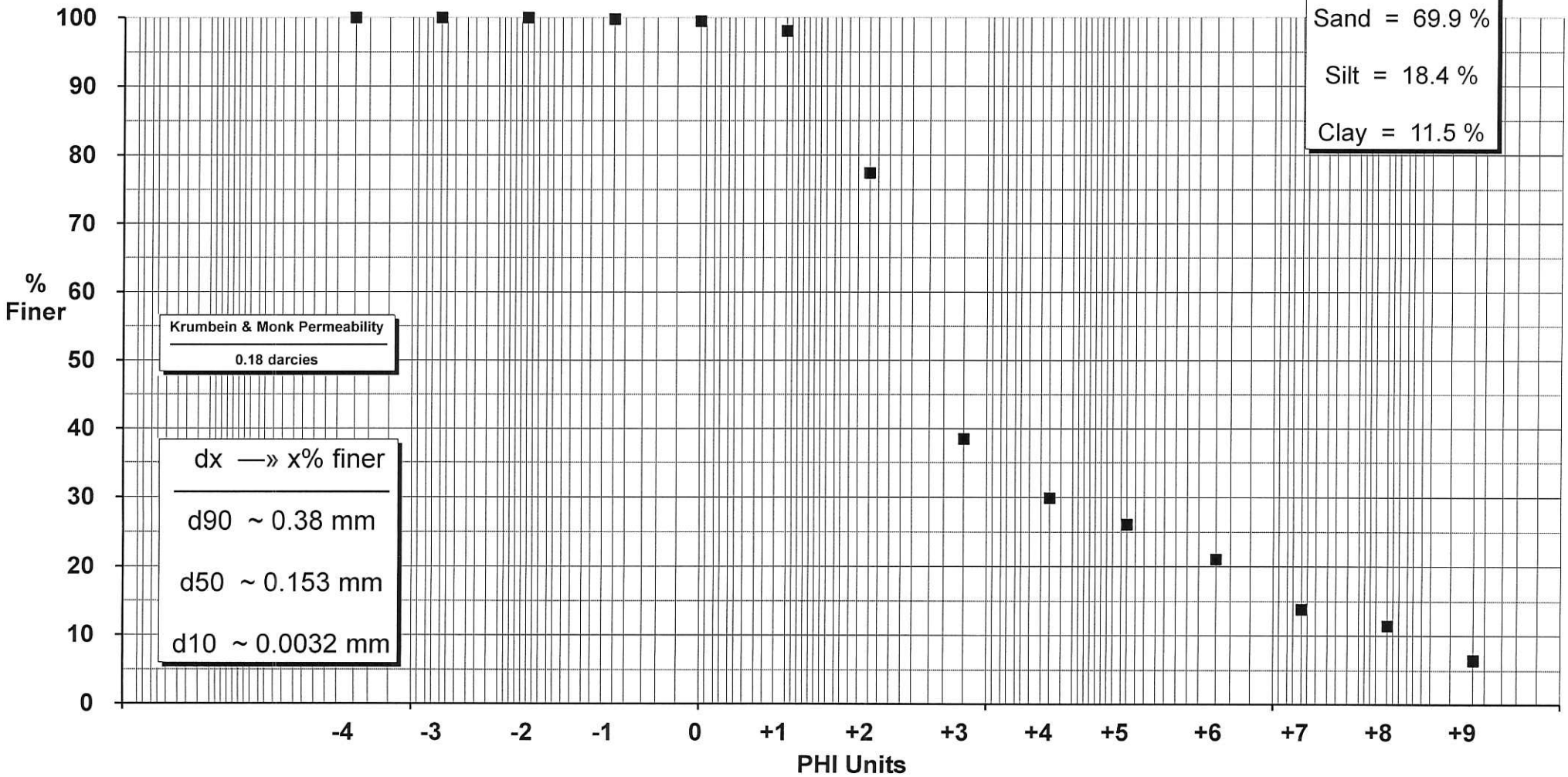
Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
67.8 %	71.3 %

Wentworth
Gravel = 0.2 %
Sand = 69.9 %
Silt = 18.4 %
Clay = 11.5 %



Krumbein & Monk Permeability

0.18 darcies

dx —» x% finer
d90 ~ 0.38 mm
d50 ~ 0.153 mm
d10 ~ 0.0032 mm

Approved

Maxxam ID: WT9287-01

SS-01NC

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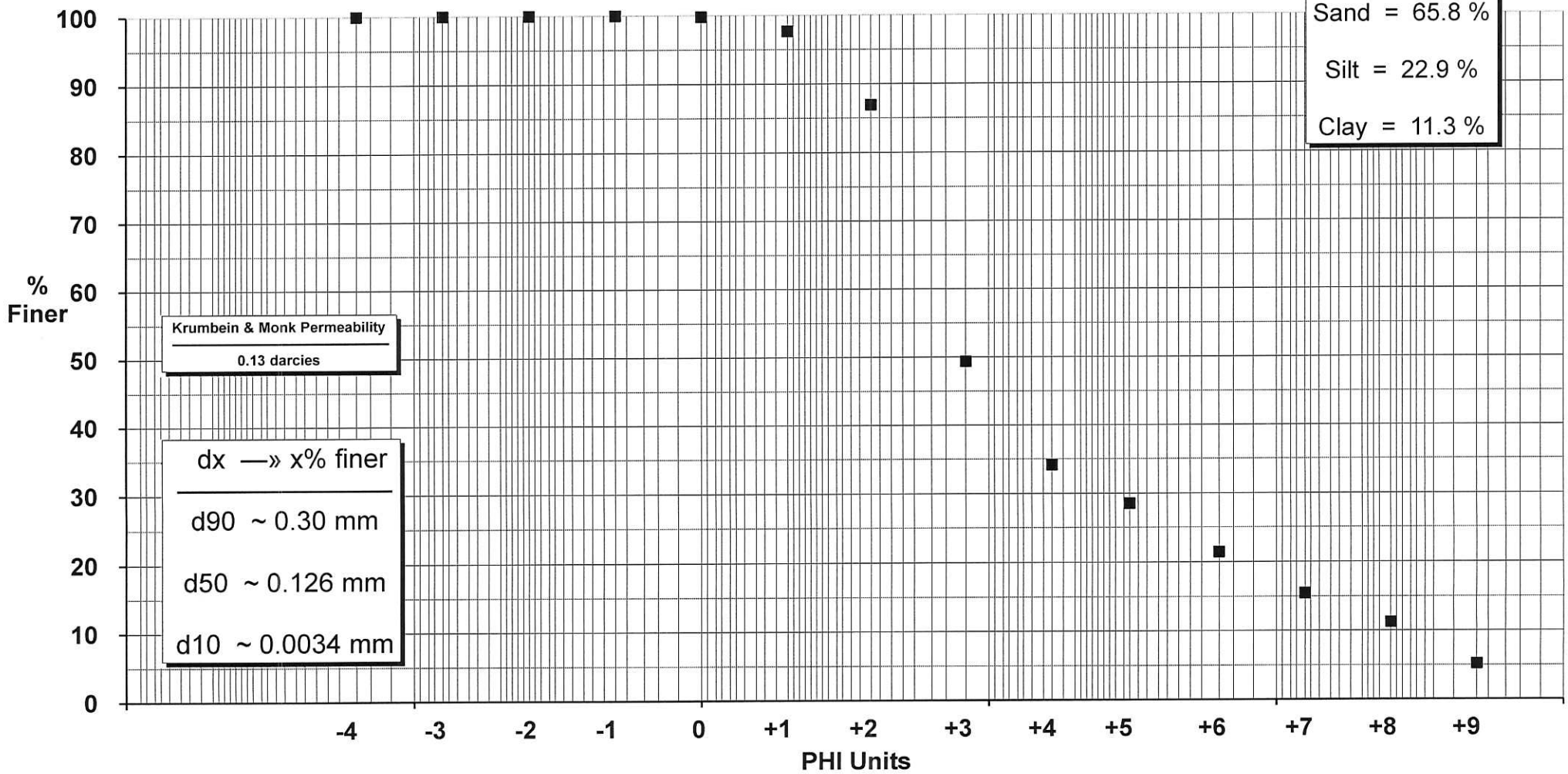
Percent Coarser than 75 µm (PHI = 3.737)	Percent Coarser than 50 µm (PHI = 4.322)
61.8 %	67.6 %

Wentworth	
Gravel	= 0.0 %
Sand	= 65.8 %
Silt	= 22.9 %
Clay	= 11.3 %



Approved

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Your P.O. #: 16300R-20
Your Project #: 121811228.200
Site Location: TIGNISH
Your C.O.C. #: ES882414

Attention: Danya MacGillivray
Stantec Consulting Ltd
Moncton - Standing Offer
115 Harrisville Blvd
Moncton, NB
E1H 3T3

Report Date: 2014/08/13
Report #: R3120212
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4E1282
Received: 2014/08/08, 08:47

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Chloride	4	N/A	2014/08/12	ATL SOP 00014	SM 22 4500-Cl- E m
Conductance - soil	4	2014/08/12	2014/08/13	ATL SOP 00004	SM 22 2510B m
TEH in Soil (PIRI) (1)	4	2014/08/08	2014/08/09	ATL SOP 00111	Atl. PIRI v3 m
Metals Water Diss. MS (2)	4	N/A	2014/08/12	ATL SOP 00058	EPA 6020A R1 m
Metals Leach, SPLP Extraction	4	2014/08/12	2014/08/13	ATL SOP 00058	EPA 6020A R1 m
Metals Solids Acid Extr. ICPMS	4	2014/08/12	2014/08/13	ATL SOP 00058	EPA 6020A R1 m
Moisture	4	N/A	2014/08/09	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	1	2014/08/08	2014/08/12	ATL SOP 00102	EPA 8270D m
PAH Compounds by GCMS (SIM) (1)	3	2014/08/11	2014/08/12	ATL SOP 00102	EPA 8270D m
VPH in Soil (PIRI)	4	2014/08/08	2014/08/11	ATL SOP 00119	Atl. PIRI v3 m
Sodium Adsorption Ratio in soil (1:5)	4	2014/08/08	2014/08/13	ATL SOP 00050	Carter 2nd ed 18.4.3
SPLP Inorganic extraction - pH	4	N/A	2014/08/12	ATL SOP 00036	EPA 1312 m
SPLP Inorganic extraction - Weight	4	N/A	2014/08/12	ATL SOP 00036	EPA 1312 m
ModTPH (T1) Calc. for Soil (3)	4	N/A	2014/08/11	N/A	Atl. PIRI v3 m

Remarks:

Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Soils are reported on a dry weight basis unless otherwise specified.
(2) Sample filtered in laboratory prior to analysis for dissolved metals.
New RDLs in effect due to release of NS Contaminated Sites Regulations. Reduced RDL based on MDL study performance. Low level analytical run checks being implemented.
(3) New RDLs in effect due to release of NS Contaminated Sites Regulations. Reduced RDL based on MDL study performance. Low level analytical run checks being implemented.

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Maxxam Job #: B4E1282
Report Date: 2014/08/13

Stantec Consulting Ltd
Client Project #: 121811228.200
Site Location: TIGNISH
Your P.O. #: 16300R-20
Sampler Initials: RM

Encryption Key

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

Leonard Muise, Project Manager
Email: LMuise@maxxam.ca
Phone# (902) 420-0203 Ext:236

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

Total cover pages: 2

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Success Through Science®

Maxxam Job #: B4E1282
Report Date: 2014/08/13

Stantec Consulting Ltd
Client Project #: 121811228.200
Site Location: TIGNISH
Your P.O. #: 16300R-20
Sampler Initials: RM

RESULTS OF ANALYSES OF SOIL

Maxxam ID		XA3191	XA3192	XA3193	XA3194	XA3194		
Sampling Date		2014/08/07	2014/08/07	2014/08/07	2014/08/07	2014/08/07		
	Units	**NC-COMPA**	**NC-COMPB**	**SC-COMPA**	**SC-COMPB**	**SC-COMPB Lab-Dup**	**RDL**	**QC Batch**
Charge/Prep Analysis								
Sample Weight (as received)	g	50	50	50	50	50	N/A	3707340
Final pH	N/A	7.84	8.71	8.31	8.69	8.76	N/A	3707342
Inorganics								
Dissolved Chloride (Cl)	mg/L	3	4	33	5	5	1	3706067
Conductivity	uS/cm	820	260	850	390		1.0	3709045
Moisture	%	19	22	16	22		1	3703968
Sodium Adsorption Ratio	N/A	0.056	0.21	2.3	1.2		N/A	3704094

ELEMENTS BY ICP/MS (SOIL)

Maxxam ID		XA3191	XA3192	XA3193	XA3194	XA3194		
Sampling Date		2014/08/07	2014/08/07	2014/08/07	2014/08/07	2014/08/07		
	Units	**NC-COMPA**	**NC-COMPB**	**SC-COMPA**	**SC-COMPB**	**SC-COMPB Lab-Dup**	**RDL**	**QC Batch**
Metals								
Dissolved Calcium (Ca)	ug/L	167000	33300	64700	29500		100	3707278
Dissolved Magnesium (Mg)	ug/L	9690	3590	11600	6480		100	3707278
Dissolved Sodium (Na)	ug/L	2730	4680	75800	27300		100	3707278
Leachable Sodium (Na)	ug/L	2900	2400	26000	7900	8200	100	3707639

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		XA3191	XA3192	XA3193	XA3194	XA3194		
Sampling Date		2014/08/07	2014/08/07	2014/08/07	2014/08/07	2014/08/07		
	Units	**NC-COMPA**	**NC-COMPB**	**SC-COMPA**	**SC-COMPB**	**SC-COMPB Lab-Dup**	**RDL**	**QC Batch**
Metals								
Acid Extractable Aluminum (Al)	mg/kg	5800	5500	4800	5800	5800	10	3707428
Acid Extractable Antimony (Sb)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Arsenic (As)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Barium (Ba)	mg/kg	22	17	19	21	21	5	3707428
Acid Extractable Beryllium (Be)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Bismuth (Bi)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	<50	50	3707428
Acid Extractable Cadmium (Cd)	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	3707428
Acid Extractable Chromium (Cr)	mg/kg	11	11	10	12	11	2	3707428
Acid Extractable Cobalt (Co)	mg/kg	5	4	4	5	5	1	3707428
Acid Extractable Copper (Cu)	mg/kg	5	4	6	5	5	2	3707428
Acid Extractable Iron (Fe)	mg/kg	12000	11000	11000	12000	12000	50	3707428
Acid Extractable Lead (Pb)	mg/kg	3.9	3.7	6.9	5.2	5.3	0.5	3707428
Acid Extractable Lithium (Li)	mg/kg	14	13	11	15	14	2	3707428
Acid Extractable Manganese (Mn)	mg/kg	200	190	180	220	230	2	3707428
Acid Extractable Mercury (Hg)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	3707428
Acid Extractable Molybdenum (Mo)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Nickel (Ni)	mg/kg	11	11	9	12	11	2	3707428
Acid Extractable Rubidium (Rb)	mg/kg	6	5	4	6	6	2	3707428
Acid Extractable Selenium (Se)	mg/kg	<1	<1	<1	<1	<1	1	3707428
Acid Extractable Silver (Ag)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	3707428
Acid Extractable Strontium (Sr)	mg/kg	17	16	16	25	33	5	3707428
Acid Extractable Thallium (Tl)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	3707428
Acid Extractable Tin (Sn)	mg/kg	<2	<2	<2	<2	<2	2	3707428
Acid Extractable Uranium (U)	mg/kg	0.6	0.5	0.4	0.4	0.6	0.1	3707428
Acid Extractable Vanadium (V)	mg/kg	15	14	16	16	16	2	3707428
Acid Extractable Zinc (Zn)	mg/kg	24	24	25	26	27	5	3707428

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		XA3191	XA3191	XA3192	XA3193	XA3194		
Sampling Date		2014/08/07	2014/08/07	2014/08/07	2014/08/07	2014/08/07		
	Units	**NC-COMPA**	**NC-COMPA Lab-Dup**	**NC-COMPB**	**SC-COMPA**	**SC-COMPB**	**RDL**	**QC Batch**
Polyaromatic Hydrocarbons								
1-Methylnaphthalene	mg/kg	<0.01	<0.01	<0.01	0.03	<0.01	0.01	3706035
2-Methylnaphthalene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	3706035
Acenaphthene	mg/kg	<0.01	<0.01	<0.01	0.15	<0.01	0.01	3706035
Acenaphthylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	3706035
Anthracene	mg/kg	0.02	<0.01	<0.01	0.13	<0.01	0.01	3706035
Benzo(a)anthracene	mg/kg	0.04	0.12	<0.01	0.09	0.01	0.01	3706035
Benzo(a)pyrene	mg/kg	0.01	0.10	<0.01	0.04	<0.01	0.01	3706035
Benzo(b)fluoranthene	mg/kg	0.02	0.11	<0.01	0.05	0.01	0.01	3706035
Benzo(g,h,i)perylene	mg/kg	<0.01	0.04	<0.01	0.02	<0.01	0.01	3706035
Benzo(j)fluoranthene	mg/kg	<0.01	0.07	<0.01	0.03	<0.01	0.01	3706035
Benzo(k)fluoranthene	mg/kg	<0.01	0.06	<0.01	0.02	<0.01	0.01	3706035
Chrysene	mg/kg	0.11	0.07	<0.01	0.08	0.02	0.01	3706035
Dibenz(a,h)anthracene	mg/kg	<0.01	0.01	<0.01	<0.01	<0.01	0.01	3706035
Fluoranthene	mg/kg	0.05	0.03	0.04	0.53	0.03	0.01	3706035
Fluorene	mg/kg	<0.01	<0.01	<0.01	0.15	<0.01	0.01	3706035
Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	0.04	<0.01	0.02	<0.01	0.01	3706035
Naphthalene	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	0.01	3706035
Perylene	mg/kg	0.01	0.03	<0.01	0.02	<0.01	0.01	3706035
Phenanthrene	mg/kg	0.01	<0.01	<0.01	0.38	<0.01	0.01	3706035
Pyrene	mg/kg	0.04	0.03	0.03	0.31	0.02	0.01	3706035
Surrogate Recovery (%)								
D10-Anthracene	%	93	86	81	88	84		3706035
D14-Terphenyl (FS)	%	99	95	96	101	100		3706035
D8-Acenaphthylene	%	83	83	77	83	77		3706035

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ATLANTIC RBCA HYDROCARBONS (SOIL)

Maxxam ID		XA3191	XA3192	XA3193	XA3194		
Sampling Date		2014/08/07	2014/08/07	2014/08/07	2014/08/07		
	Units	**NC-COMPA**	**NC-COMPB**	**SC-COMPA**	**SC-COMPB**	**RDL**	**QC Batch**
Petroleum Hydrocarbons							
Benzene	mg/kg	<0.03	<0.03	<0.03	<0.03	0.03	3704918
Toluene	mg/kg	<0.03	<0.03	<0.03	<0.03	0.03	3704918
Ethylbenzene	mg/kg	<0.03	<0.03	<0.03	<0.03	0.03	3704918
Xylene (Total)	mg/kg	<0.05	<0.05	<0.05	<0.05	0.05	3704918
C6 - C10 (less BTEX)	mg/kg	<3	<3	<3	<3	3	3704918
>C10-C16 Hydrocarbons	mg/kg	<10	<10	14	<10	10	3704228
>C16-C21 Hydrocarbons	mg/kg	<10	<10	31	<10	10	3704228
>C21-<C32 Hydrocarbons	mg/kg	26	<20	99	22	20	3704228
Modified TPH (Tier1)	mg/kg	26	<20	140	22	20	3703915
Reached Baseline at C32	mg/kg	YES	NA	YES	YES	N/A	3704228
Hydrocarbon Resemblance	mg/kg	COMMENT(1)	NA	COMMENT(2)	COMMENT(3)	N/A	3704228
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	94	95	97	94		3704228
Isobutylbenzene - Volatile	%	108	106	101	103		3704918
n-Dotriacontane - Extractable	%	79	85	95	73		3704228

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Unidentified compound(s) in lube oil range.
(2) - One product in fuel oil range. Lube oil fraction.
(3) - Unidentified compound(s) in lube oil range. Possible lube oil fraction.

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Package 1	8.3°C

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

GENERAL COMMENTS

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3704228	Isobutylbenzene - Extractable	2014/08/09	98	30 - 130	95	30 - 130	94	%				
3704228	n-Dotriacontane - Extractable	2014/08/09	86	30 - 130	83	30 - 130	81	%				
3704228	>C10-C16 Hydrocarbons	2014/08/09	88	30 - 130	87	30 - 130	<10	mg/kg	NC	50		
3704228	>C16-C21 Hydrocarbons	2014/08/09	102	30 - 130	99	30 - 130	<10	mg/kg	NC	50		
3704228	>C21-<C32 Hydrocarbons	2014/08/09	105	30 - 130	104	30 - 130	<20	mg/kg	NC	50		
3704918	Isobutylbenzene - Volatile	2014/08/09	95	60 - 140	92	60 - 140	96	%				
3704918	Benzene	2014/08/09	99	60 - 140	90	60 - 140	<0.03	mg/kg	NC	50		
3704918	Toluene	2014/08/09	135	60 - 140	103	60 - 140	<0.03	mg/kg	NC	50		
3704918	Ethylbenzene	2014/08/09	122	60 - 140	90	60 - 140	<0.03	mg/kg	NC	50		
3704918	Xylene (Total)	2014/08/09	134	60 - 140	95	60 - 140	<0.05	mg/kg	NC	50		
3704918	C6 - C10 (less BTEX)	2014/08/09					<3	mg/kg	NC	50		
3706035	D10-Anthracene	2014/08/12	102	30 - 130	91	30 - 130	86	%				
3706035	D14-Terphenyl (FS)	2014/08/12	109	30 - 130	101	30 - 130	98	%				
3706035	D8-Acenaphthylene	2014/08/12	94	30 - 130	83	30 - 130	82	%				
3706035	1-Methylnaphthalene	2014/08/12	71	30 - 130	67	30 - 130	<0.01	mg/kg	NC	50		
3706035	2-Methylnaphthalene	2014/08/12	70	30 - 130	71	30 - 130	<0.01	mg/kg	NC	50		
3706035	Acenaphthene	2014/08/12	74	30 - 130	74	30 - 130	<0.01	mg/kg	NC	50		
3706035	Acenaphthylene	2014/08/12	79	30 - 130	74	30 - 130	<0.01	mg/kg	NC	50		
3706035	Anthracene	2014/08/12	88	30 - 130	83	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(a)anthracene	2014/08/12	87	30 - 130	88	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(a)pyrene	2014/08/12	81	30 - 130	84	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(b)fluoranthene	2014/08/12	85	30 - 130	89	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(g,h,i)perylene	2014/08/12	75	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(j)fluoranthene	2014/08/12	89	30 - 130	89	30 - 130	<0.01	mg/kg	NC	50		
3706035	Benzo(k)fluoranthene	2014/08/12	90	30 - 130	89	30 - 130	<0.01	mg/kg	NC	50		
3706035	Chrysene	2014/08/12	88	30 - 130	94	30 - 130	<0.01	mg/kg	45.8	50		
3706035	Dibenz(a,h)anthracene	2014/08/12	75	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3706035	Fluoranthene	2014/08/12	81	30 - 130	79	30 - 130	<0.01	mg/kg	NC	50		
3706035	Fluorene	2014/08/12	74	30 - 130	73	30 - 130	<0.01	mg/kg	NC	50		
3706035	Indeno(1,2,3-cd)pyrene	2014/08/12	77	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3706035	Naphthalene	2014/08/12	60	30 - 130	64	30 - 130	<0.01	mg/kg	NC	50		
3706035	Perylene	2014/08/12	78	30 - 130	81	30 - 130	<0.01	mg/kg	NC	50		
3706035	Phenanthrene	2014/08/12	75	30 - 130	76	30 - 130	<0.01	mg/kg	NC	50		
3706035	Pyrene	2014/08/12	80	30 - 130	78	30 - 130	<0.01	mg/kg	NC	50		
3706067	Dissolved Chloride (Cl)	2014/08/12	NC	80 - 120	104	80 - 120	<1	mg/L	2.6	25	109	80 - 120
3707278	Dissolved Calcium (Ca)	2014/08/12	85	80 - 120	88	80 - 120	<100	ug/L				
3707278	Dissolved Magnesium (Mg)	2014/08/12	105	80 - 120	108	80 - 120	<100	ug/L				
3707278	Dissolved Sodium (Na)	2014/08/12	98	80 - 120	100	80 - 120	107, RDL=100	ug/L				
3707340	Sample Weight (as received)	2014/08/12					NA, RDL=N/A	g	0	N/A		

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3707342	Final pH	2014/08/12					4.26, RDL=N/A	N/A	0.8	N/A		
3707428	Acid Extractable Antimony (Sb)	2014/08/13	99	75 - 125	106	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Arsenic (As)	2014/08/13	99	75 - 125	101	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Barium (Ba)	2014/08/13	99	75 - 125	100	75 - 125	<5	mg/kg	NC	35		
3707428	Acid Extractable Beryllium (Be)	2014/08/13	99	75 - 125	99	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Bismuth (Bi)	2014/08/13	102	75 - 125	103	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Boron (B)	2014/08/13	91	75 - 125	96	75 - 125	<50	mg/kg	NC	35		
3707428	Acid Extractable Cadmium (Cd)	2014/08/13	100	75 - 125	101	75 - 125	<0.3	mg/kg	NC	35		
3707428	Acid Extractable Chromium (Cr)	2014/08/13	95	75 - 125	97	75 - 125	<2	mg/kg	3.7	35		
3707428	Acid Extractable Cobalt (Co)	2014/08/13	97	75 - 125	98	75 - 125	<1	mg/kg	NC	35		
3707428	Acid Extractable Copper (Cu)	2014/08/13	98	75 - 125	99	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Lead (Pb)	2014/08/13	98	75 - 125	99	75 - 125	<0.5	mg/kg	1.3	35		
3707428	Acid Extractable Lithium (Li)	2014/08/13	104	75 - 125	102	75 - 125	<2	mg/kg	3.9	35		
3707428	Acid Extractable Manganese (Mn)	2014/08/13	NC	75 - 125	102	75 - 125	<2	mg/kg	3.3	35		
3707428	Acid Extractable Mercury (Hg)	2014/08/13	92	75 - 125	97	75 - 125	<0.1	mg/kg	NC	35		
3707428	Acid Extractable Molybdenum (Mo)	2014/08/13	101	75 - 125	95	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Nickel (Ni)	2014/08/13	99	75 - 125	100	75 - 125	<2	mg/kg	5.1	35		
3707428	Acid Extractable Rubidium (Rb)	2014/08/13	100	75 - 125	103	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Selenium (Se)	2014/08/13	98	75 - 125	103	75 - 125	<1	mg/kg	NC	35		
3707428	Acid Extractable Silver (Ag)	2014/08/13	100	75 - 125	101	75 - 125	<0.5	mg/kg	NC	35		
3707428	Acid Extractable Strontium (Sr)	2014/08/13	101	75 - 125	100	75 - 125	<5	mg/kg	NC	35		
3707428	Acid Extractable Thallium (Tl)	2014/08/13	100	75 - 125	101	75 - 125	<0.1	mg/kg	NC	35		
3707428	Acid Extractable Tin (Sn)	2014/08/13	99	75 - 125	102	75 - 125	<2	mg/kg	NC	35		
3707428	Acid Extractable Uranium (U)	2014/08/13	101	75 - 125	101	75 - 125	<0.1	mg/kg	NC	35		
3707428	Acid Extractable Vanadium (V)	2014/08/13	94	75 - 125	95	75 - 125	<2	mg/kg	1	35		
3707428	Acid Extractable Zinc (Zn)	2014/08/13	NC	75 - 125	102	75 - 125	<5	mg/kg	3.2	35		
3707428	Acid Extractable Aluminum (Al)	2014/08/13					<10	mg/kg	0.9	35		
3707428	Acid Extractable Iron (Fe)	2014/08/13					<50	mg/kg	3.5	35		

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3707639	Leachable Sodium (Na)	2014/08/13	97	80 - 120	98	80 - 120	1500, RDL=100(1)	ug/L	3.2	35		
3709045	Conductivity	2014/08/13							0.6	35		

N/A = Not Applicable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).
(1) - Detectable concentration in the blank is typical for matrix.

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Validation Signature Page

Maxxam Job #: B4E1282

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

Mike MacGillivray, Scientific Specialist (Inorganics)

Rose Marie MacDonald, Scientific Specialist (Organics)

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

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