

# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

PIT NO. 1  
July 18, 2014

## 7.0 PIT NO. 1

### 7.1 Site Description

The Pit No. 1/Helipad site is located south of the Main Base on the north side of the main access road. The area is a heavily worked area consisting of gravel and boulders with low vegetation along the perimeter. Terrain in the area slopes moderately to the west. Surface drainage (apparent groundwater flow direction) is expected to be to the east towards Pit No. 3. This area has been identified as a possible former waste site/drum storage area (ESG, 2007).

### 7.2 Description of Site Work

During Years 1 to 3 of the Implementation of the RAP (2011 to 2013), Pit No. 1 was used as a Main Laydown Area to temporarily store PCB-impacted soil (in bags, on a liner) and clean backfill. Once the PCB-impacted soil and liners were removed from the area, 12 soil samples were collected in the laydown area to determine PCB concentrations in soil following 3 years of soil storage (13-ML1 to 13-ML12). The upper 0.10 to 0.15 m of soil in the worked areas was then removed and the area was backfilled with a layer of clean material. The soil sample locations and area of surficial soil removal are shown on Drawing No. 121411777.610-EE-07 in Appendix 7A.

### 7.3 Summary of Environmental Concerns at Pit No. 1

Based on the recommendations of the Phase II/III ESA, HHERA and RAP/RMP prepared by Stantec in 2010, remediation of PCB-impacted soil is required at Pit No. 1 in order to obtain maximum site concentrations of PCBs less than the applicable SSTL for the Residential Area. A summary of the estimated areas and volumes of soil requiring remediation for PCBs is shown in Table 7.1.

**Table 7.1 Summary of Soil Requiring Remediation - Pit No. 1**

Remedial Objectives	Other Issues Identified <sup>1</sup>	Sample Locations	Area (m <sup>2</sup> )	Depth (m)	Volume (m <sup>3</sup> )	Fully Delineated?	Maximum Concentration (mg/kg)	Priority Level <sup>2</sup>
PCB	-	TP152-BS1	50	1.4	70	No	-	2
	TPH	MW18-SS4	50	2.4	120	No	TPH: 2,300	2

**Notes:**  
<sup>1</sup> Site data was screened against typical landfill acceptance criteria (1,000 mg/kg for TPH, 33 mg/kg and CCME Industrial guidelines for metals and PCBs). This information is required during the selection of disposal/treatment options. Exceedances of these values do not necessarily represent a risk to human or ecological health.  
<sup>2</sup> Priority based on chemical of concern and location of impacts, with 1 being the highest priority and 4 being the lowest priority.

A site plan showing sample locations and the estimated area of soil requiring remediation is

## **ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR**

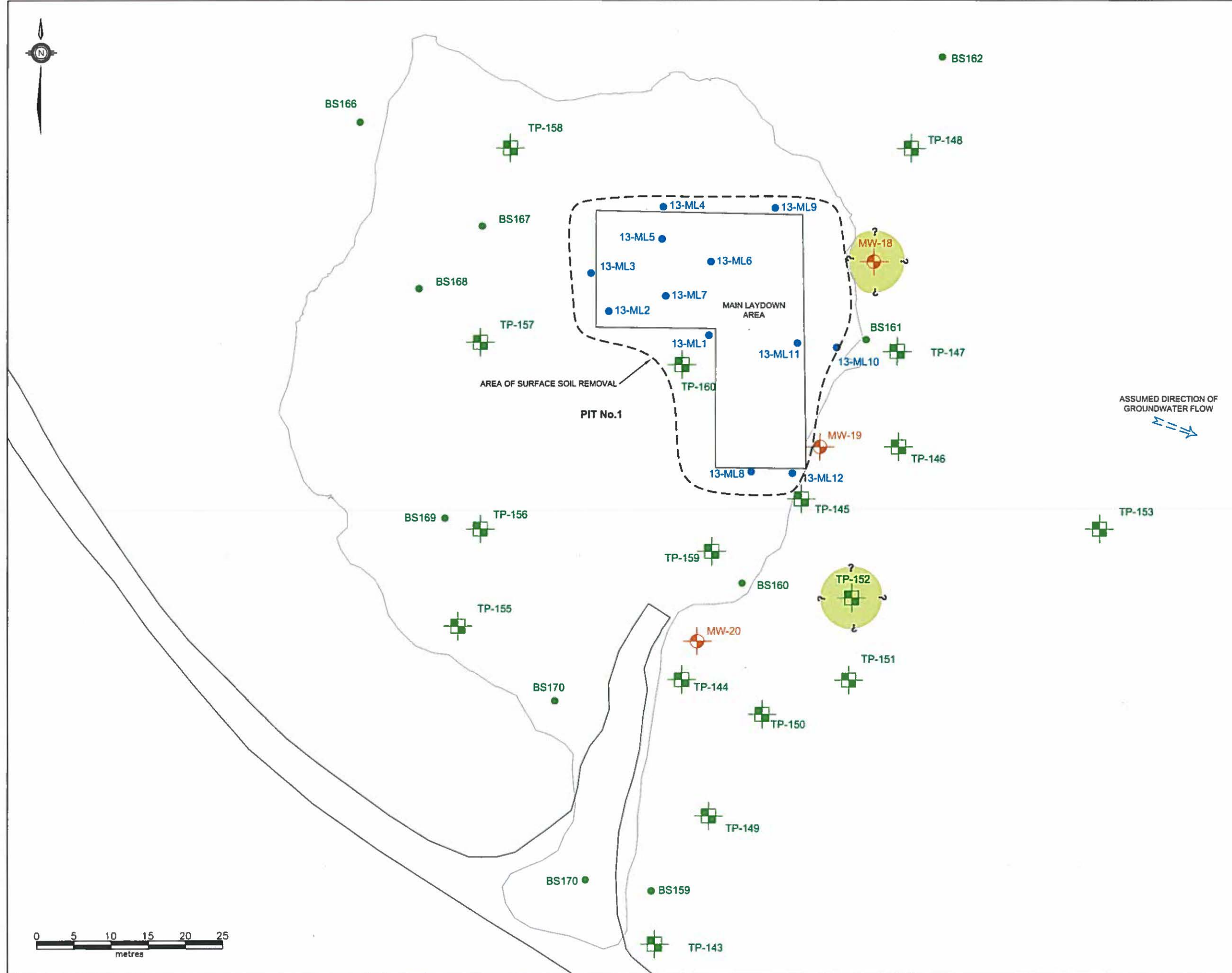
PIT NO. 1

July 18, 2014

provided in Appendix 7A (Drawing No. 121411777.610-EE-07). Photos showing the areas requiring soil remediation are provided in Appendix 7B. A laboratory analytical summary table for PCBs at Pit No. 1 is provided in Appendix 7C.

# APPENDIX 7A

Site Plan – Pit No. 1



- LEGEND**
- TEST PIT (STANTEC 2009)
  - MONITOR WELL (STANTEC 2009)
  - BULK SAMPLE (STANTEC 2009)
  - BULK SAMPLE (STANTEC 2013)
  - ESTIMATED AREA OF PCB IMPACTED SOIL REQUIRING REMEDIATION

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

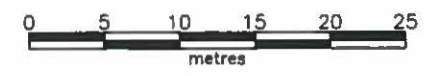
CLIENT:  
**NEWFOUNDLAND AND LABRADOR DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

PROJECT TITLE:  
**ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, NL**

DRAWING TITLE:  
**SITE PLAN - PIT No. 1**

**Stantec Consulting Ltd.**

SCALE: 1:500	DATE: JULY 15, 2014	REV. No. 0
DRAWN BY: N.M.	EDITED BY: -	CHECKED BY: AR
DRAWING No. 121411777.610-EE-07	CAD FILE: 121411777_610-EE-07.DWG	



## APPENDIX 7B

Site Photos – Pit No. 1

Site Photos – Pit No. 1



Photo 1. Pit No. 1 in 2011 prior to the installation of liners for temporary soil storage, looking northeast.



Photo 2. Pit No. 1 in 2012 during temporary storage of PCB-impacted soil (in soil bags) and backfill material, looking south.

Site Photos – Pit No. 1



Photo 3. Pit No. 1 following bag removal, surficial soil removal and backfilling in 2013, looking northeast.



Photo 4. Pit No. 1 following bag removal, surficial soil removal and backfilling in 2013, looking north.

## APPENDIX 7C

Analytical Summary Tables – Pit No. 1



Table 7-1 Results of Laboratory Analysis of PCBs in Soil - Pit No. 1  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.610

Sample ID	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)	Comments
	RDL	0.05	-
	Units	mg/kg	-
	Generic Criteria <sup>1</sup>	1.3	-
	Remedial Target <sup>2</sup>	9	-
<b>2009 Sampling - Stantec</b>			
TP149-BS1	0.2 - 0.3	0.69	-
TP152-BS1	0.2 - 0.3	<b>20</b>	-
TP153-BS1	0.7 - 0.8	<b>1.1</b>	-
TP157-BS2	2.1 - 2.2	nd	-
TP160-BS1	0.9 - 1.0	0.28	-
BS161	0.00 - 0.20	0.18	-
BS163	0.00 - 0.10	0.08	-
BS165	0.00 - 0.20	<0.05	-
MW18-SS4	1.83 - 2.44	<b>11</b>	-
<b>2013 Sampling - Stantec</b>			
13-ML1	0.0 - 0.1	<b>2.0</b>	Soil removed.
13-ML2	0.0 - 0.1	<b>1.3</b>	Soil removed.
13-ML3	0.0 - 0.1	<b>2.0</b>	Soil removed.
13-ML4	0.0 - 0.1	<b>7.3</b>	Soil removed.
13-ML5	0.0 - 0.1	<b>1.5</b>	Soil removed.
13-ML6	0.0 - 0.1	<b>1.5</b>	Soil removed.
13-ML7	0.0 - 0.1	0.78	Soil removed.
13-ML8	0.0 - 0.1	0.63	Soil removed.
13-ML9	0.0 - 0.1	<b>2.4</b>	Soil removed.
13-ML10	0.0 - 0.1	0.75	Soil removed.
13-ML11	0.0 - 0.1	<b>1.1</b>	Soil removed.
13-ML12	0.0 - 0.1	<b>2.2</b>	Soil removed.

**Notes:**

1 = CCME Canadian Soil Quality Guideline (CSQG) for a Residential/Parkland Site (CCME on-line 2014)

2 = SSTL calculated for PCBs in the Residential Area (Stantec, 2010)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

**Bold/Italics** = Value exceeds generic criteria (i.e., CCME CSQG)

Shaded = Value exceeds SSTL calculated for PCBs in the Residential Area (Stantec, 2010)

# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

PIT NO. 3  
July 18, 2014

## 8.0 PIT NO. 3

### 8.1 Site Description

Pit No. 3 is located south of the Main Base and east of Pit No. 1/Helipad, on the north side of the main access road. The area is heavily worked and consists of gravel, boulders and bedrock outcroppings with low vegetation and some trees along the perimeter of the pit. Terrain in the area slopes moderately to the southwest. Surface drainage (apparent groundwater flow direction) is expected to be to the southeast towards the Small Pond Bog and the Residential Subdivision.

### 8.2 Description of Site Work

No additional delineation or remediation work was completed at Pit No. 3 between 2011 and 2013. A visual site inspection was performed to refine the estimated depth of impacts. No changes were made to the estimated depth of impacts at Pit No. 3. Photos were taken of each area requiring remediation for future planning purposes and are provided in Appendix 8B.

### 8.3 Summary of Environmental Concerns at Pit No. 3

Based on the recommendations of the Phase II/III ESA, HHERA and RAP/RMP prepared by Stantec in 2010, remediation of TPH-impacted soil is recommended at Pit No. 3 in order to obtain site-wide EPCs less than the applicable SSTLs. A summary of the estimated areas and volumes of soil requiring remediation is shown in Table 8.1. Depths of impacts were adjusted herein to more accurately reflect the average thickness of soil cover over bedrock.

**Table 8.1 Summary of Soil Requiring Remediation - Pit No. 3**

Remedial Objectives	Other Issues Identified <sup>1</sup>	Sample Locations	Area (m <sup>2</sup> )	Depth (m)	Volume (m <sup>3</sup> )	Fully Delineated?	Maximum Concentration (mg/kg)	Priority Level <sup>2</sup>
TPH	-	BS239, BS240, BS241, P3-TP2, P3-TP4, P3-TP6, P3-TP7, P3-TP8, TP-161, TP-162, TP-164, TP-165, TP-166, TP-169, BS271, MW27, MW28, MW29, MW30	3,820	1.0	3,820	No	TPH: 77,000	3
TPH	-	BS237, P3-BS3, P3-BS4	250	0.5	125	Yes	TPH: 56,000	3
<b>Notes:</b> <sup>1</sup> Site data was screened against typical landfill acceptance criteria (1,000 mg/kg for TPH, 33 mg/kg and CCME Industrial guidelines for metals and PCBs). This information is required during the selection of disposal/treatment options. Exceedances of these values do not necessarily represent a risk to human or ecological health. <sup>2</sup> Priority based on chemical of concern and location of impacts, with 1 being the highest priority and 4 being the lowest priority.								

## **ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR**

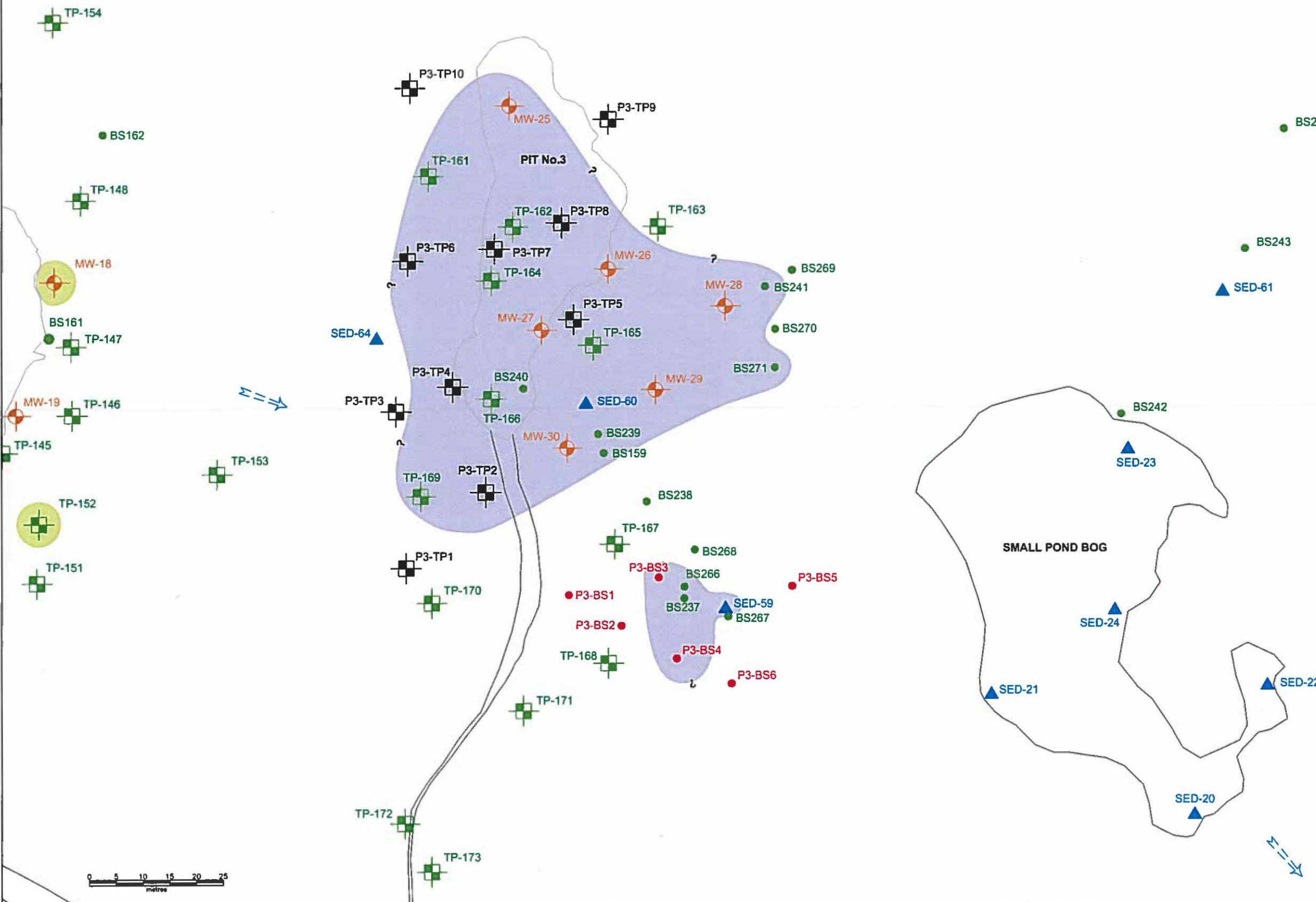
PIT NO. 3

July 18, 2014

A site plan showing sample locations and the estimated area of soil requiring remediation is provided in Appendix 8A (Drawing No. 121411777.610-EE-08). Photos showing the areas requiring soil remediation are provided in Appendix 8B. A laboratory analytical summary table for the COC at Pit No. 3 (i.e., TPH/BTEX) is provided in Appendix 8C.

# APPENDIX 8A

Site Plan – Pit No. 3



**LEGEND**

- TEST PIT (STANTEC 2010)
- TEST PIT (STANTEC 2009)
- MONITOR WELL (STANTEC 2009)
- BULK SOIL SAMPLE (STANTEC 2010)
- BULK SOIL SAMPLE (STANTEC 2009)
- SEDIMENT SAMPLE (STANTEC 2009)
- UNKNOWN EXTENT OF IMPACTS
- ESTIMATED AREA OF TPH IMPACTED SOIL REQUIRING REMEDIATION
- ESTIMATED AREA OF PCB IMPACTED SOIL REQUIRING REMEDIATION
- INFERRED GROUNDWATER FLOW DIRECTION

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

CLIENT:  
**NEWFOUNDLAND AND LABRADOR DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

PROJECT TITLE:  
**ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, NL**

DRAWING TITLE:  
**SITE PLAN - PIT No.3**

**Stantec Consulting Ltd.**

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## APPENDIX 8B

Site Photos – Pit No. 3

Site Photos – Pit No. 3

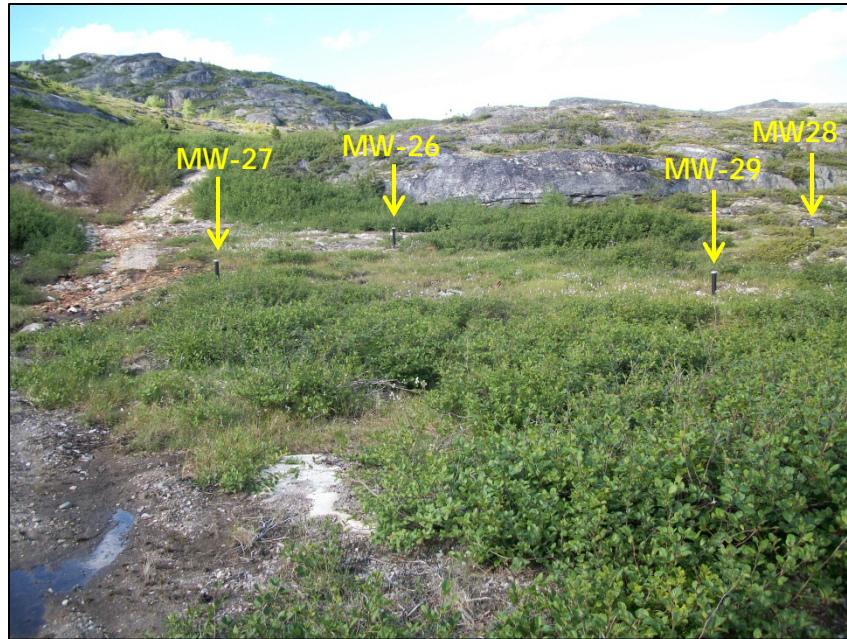


Photo 1. Area of TPH-impacted soil requiring remediation (BS239, BS240, BS241, P3-TP2, P3-TP4, P3-TP6, P3-TP7, P3-TP8, TP-161, TP-162, TP-164, TP-165, TP-166, TP-169, BS271, MW27, MW28, MW29, MW30), looking north.



Photo 2. Area of TPH-impacted soil requiring remediation (BS239, BS240, BS241, P3-TP2, P3-TP4, P3-TP6, P3-TP7, P3-TP8, TP-161, TP-162, TP-164, TP-165, TP-166, TP-169, BS271, MW27, MW28, MW29, MW30), looking east.

Site Photos – Pit No. 3



Photo 3. Partially buried debris observed at Pit No. 3.



Photo 4. Heavy alders located in the vicinity of the area requiring TPH-remediation (BS237, P3-BS3 and P3-BS4), looking east from the access road.



## APPENDIX 8C

Analytical Summary Tables – Pit No. 3

Table 8-1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pit No. 3  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)					Resemblance
		Benzene	Toluene	Ethyl-benzene	Xylenes	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>16</sub> (Fuel Range)	C <sub>16</sub> -C <sub>21</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)	Modified TPH - Tier I <sup>3</sup>	
	RDL	0.03	0.03	0.03	0.05	3	15	15	20	-	
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	
	Tier I RBSLs <sup>1</sup>	0.042	0.35	0.065	8.8	-	-	-	270	-	
	SSTL <sup>2</sup>	-	-	-	-	-	-	-	1,700	-	
<b>2009 Sampling - Stantec</b>											
TP161-BS1	0.2 - 0.3	<0.3	<0.3	<0.3	<0.5	1,200 (30)	37,000 (150)	81	<b>39,000</b> (200)	FO	
TP161-BS2 <sup>4</sup>	0.3 - 1.0	<0.03	<0.03	<0.03	<0.05	-	-	-	<b>1,600</b>	FO	
TP162-BS2	1.6 - 1.7	<0.03	<0.03	<0.03	<0.05	190	2,600	36	<b>2,800</b>	FO	
TP164-BS1	0.2 - 0.3	<0.03	<0.03	<0.03	<0.09	180	19,000 (75)	180	<b>19,000</b> (80)	FO	
TP165-BS2	0.7 - 0.8	<0.03	<0.03	<0.03	<0.05	81	5,200	210	<b>5,500</b>	FO	
TP166-BS1	0.5 - 0.6	<0.03	0.07	<0.03	0.08	190	10,000 (75)	48	<b>10,000</b> (80)	FO	
TP167-BS1	0.4 - 0.5	<0.03	<0.03	<0.03	<0.05	10	760	39	<b>800</b>	WFO	
TP169-BS1	0.2 - 0.3	<0.03	0.48	<0.03	12	470	76,000 (750)	950 (75)	<b>77,000</b> (800)	FO, ULO	
TP169-BS2	1.4 - 1.5	<0.03	<0.03	<0.03	0.36	66	280	<15	<b>350</b>	FO	
TP170-BS2	1.5 - 1.6	<0.03	<0.03	<0.03	<0.05	<3	<15	<15	<20	-	
TP171-BS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	<3	230	900	<b>1,100</b>	OP F/L, Possible LO,	
TP172-BS1	0.0 - 0.3	<0.03	0.20	<0.03	0.16	<3	120	570	<b>700</b>	FO/LO, LO, UFO/LO	
TP172-BS1-Lab-Dup	0.0 - 0.3	<0.03	0.15	<0.03	0.27	<3	-	-	-	-	
TP176-BS1	0.6 - 0.7	<0.03	<0.03	<0.03	<0.05	<3	56	590	<b>650</b>	LO	
TP176-BS1-Lab-Dup	0.6 - 0.7	<0.03	<0.03	<0.03	<0.05	<3	-	-	-	-	
BS237	0.00 - 0.20	<0.03	<0.03	<0.03	<0.05	<3	24,000 (75)	740	<b>24,000</b> (80)	WFO	
BS239	0.00 - 0.20	<0.03	<0.03	<0.03	<0.05	69	6,900	130	<b>7,100</b>	FO	
BS240	0.00 - 0.25	<0.03	<0.03	<0.03	0.09	110	4,600	85	<b>4,800</b>	FO	
BS241	0.00 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	4,300	140	<b>4,400</b>	FO	

**Notes:**

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with potable groundwater and coarse grained soil, fuel oil impacts (July 2012)

2 = SSTL calculated for TPH at the Former Radar Site (Stantec, 2010)

3 = Modified TPH - Tier I does not include BTEX

4 = TPH Fractionation results

# (#) = Elevated RDL shown in brackets

RDL = Reportable Detection Limit for routine analysis

Lab-dup = laboratory duplicate sample

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

**Bold/Italics** = Value exceeds generic criteria (i.e., Tier I RBSL) for a residential site with potable groundwater, coarse grained soil and fuel oil impacts

Shaded = Value exceeds SSTL calculated for TPH at Former Radar Site (Stantec, 2010)

**Resemblance**

FO = Fuel oil fraction

WFO = Weathered fuel oil fraction

LO = Lube oil fraction

FO/LO = One product in fuel oil/lube oil range

NRPP = No resemblance to petroleum products

NRLO = No resemblance to products in the lube oil range

UFO/LO = Unidentified compound(s) in fuel/lube oil range

ULO = Unidentified compound(s) in lube oil range

Table 8-1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pit No. 3  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)					Resemblance
		Benzene	Toluene	Ethyl-benzene	Xylenes	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>16</sub> (Fuel Range)	C <sub>16</sub> -C <sub>21</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)	Modified TPH - Tier I <sup>3</sup>	
	RDL	0.03	0.03	0.03	0.05	3	15	15	20	-	
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	
	Tier I RBSLs <sup>1</sup>	0.042	0.35	0.065	8.8	-	-	-	270	-	
	SSTL <sup>2</sup>	-	-	-	-	-	-	-	1,700	-	
<b>2009 Sampling - Stantec (...continued)</b>											
BS267	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	370	140	<b>510</b>	WFO	
BS268	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	720	190	<b>920</b>	FO, NRLO	
BS269	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	35	130	170	NRPP	
BS270	Not recorded	<0.03	<0.03	<0.07	<0.09	<3	190	200	<b>400</b>	FO/LO, UFO/LO	
BS271	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	5,000	230	<b>5,200</b>	WFO	
MW25-SS2 <sup>4</sup>	0.61 - 0.76	<0.03	<0.03	<0.03	0.07	-	-	-	<b>10,000</b>	FO	
MW26-SS4	2.13 - 2.74	<0.03	<0.03	<0.03	<0.05	<3	19	<15	<20	WFO	
MW27-SS1	0.00 - 0.61	<0.03	<0.03	<0.03	<0.06	270	8,700	140	<b>9,100</b>	FO	
MW27-SS3	1.22 - 1.83	<0.03	<0.03	<0.03	<0.05	50	790	42	<b>880</b>	FO	
MW28-SS1	0.00 - 0.10	<0.03	<0.03	<0.03	<0.05	9	2,400	500	<b>2,900</b>	WFO, Possible LO	
MW29-SS2	0.61 - 1.22	<0.03	0.09	<0.03	0.16	130	8,700	190	<b>9,000</b>	FO	
MW30-SS2	0.61 - 1.22	<0.03	0.05	<0.03	0.46	230	6,700	87	<b>7,000</b>	WFO	
MW30-SS2 Lab-Dup	0.61 - 1.22	<0.03	0.04	<0.03	0.46	200	-	-	-	-	
SED-59 <sup>5</sup>	-	<0.03	<0.03	<0.03	<0.05	<3	1,600	360	<b>2,000</b>	FO/LO, WFO	
SED-60 <sup>5</sup>	-	<0.03	<0.03	<0.03	<0.05	5	1,600	83	<b>1,600</b>	FO/LO, WFO	
SED-64 <sup>5</sup>	-	<0.1	<0.1	<0.1	<0.3	58 (10)	<15	190	240	LO	

**Notes:**

- 1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with potable groundwater and coarse grained soil, fuel oil impacts (July 2012)
- 2 = SSTL calculated for TPH at the Former Radar Site (Stantec, 2010)
- 3 = Modified TPH - Tier I does not include BTEX
- 4 = TPH Fractionation results
- 5 = Sediment sample
- # (#) = Elevated RDL shown in brackets
- RDL = Reportable Detection Limit for routine analysis
- Lab-dup = laboratory duplicate sample
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- Bold/Italics*** = Value exceeds generic criteria (i.e., Tier I RBSL) for a residential site with potable groundwater, coarse grained soil and fuel oil impacts
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**Resemblance**

- FO = Fuel oil fraction
- WFO = Weathered fuel oil fraction
- LO = Lube oil fraction
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- NRLO = No resemblance to products in the lube oil range
- UFO/LO = Unidentified compound(s) in fuel/lube oil range
- ULO = Unidentified compound(s) in lube oil range

Table 8-1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pit No. 3  
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 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)					Resemblance
		Benzene	Toluene	Ethyl-benzene	Xylenes	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>16</sub> (Fuel Range)	C <sub>16</sub> -C <sub>21</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)	Modified TPH - Tier I <sup>3</sup>	
	RDL	0.03	0.03	0.03	0.05	3	15		15	20	-
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	-
	Tier I RBLS <sup>1</sup>	0.042	0.35	0.065	8.8	-	-	-	-	270	-
	SSTL <sup>2</sup>	-	-	-	-	-	-	-	-	1,700	-
<b>2010 Sampling - Stantec</b>											
P3-TP1 BS1	0.0 - 0.3	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	<15	<20	-
P3-TP2 BS1	0.0 - 0.35	<0.03	<0.03	<0.03	<0.05	230	7,200	720	270	<b>8,400</b>	WFO
P3-TP4 BS1	0.0 - 0.3	<0.03	<0.03	<0.03	0.3	66	16,000	3,900	430	<b>21,000</b>	WFO
P3-TP6 BS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	210	13,000	2,200	200	<b>16,000</b>	WFO
P3-TP7 BS1	0.0 - 0.3	<0.03	0.03	<0.03	0.08	440	14,000	2,900	240	<b>18,000</b>	FO
P3-TP8 BS1	0.0 - 0.5	<0.03	<0.03	<0.03	<0.05	640	4,600	790	56	<b>6,100</b>	WFO
P3-TP10 BS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	<3	32	79	<15	110	WFO
P3-BS2-10	0.0 - 0.25	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	20	<20	NRLO
P3-BS3-10	0.0 - 0.25	<0.03	<0.03	<0.03	<0.05	<3	18,000	5,300	580	<b>24,000</b>	FO
P3-BS4-10	0.0 - 0.25	<0.03	<0.03	<0.03	<0.05	53	48,000	7,100	590	<b>56,000</b>	FO

**Notes:**

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBLS) for a residential site with potable groundwater and coarse grained soil, fuel oil impacts (July 2012)

2 = SSTL calculated for TPH at the Former Radar Site (Stantec, 2010)

3 = Modified TPH - Tier I does not include BTEX

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

***Bold/Italics*** = Value exceeds generic criteria (i.e., Tier I RBSL) for a residential site with potable groundwater, coarse grained soil and fuel oil impacts

**Shaded** = Value exceeds SSTL calculated for TPH at Former Radar Site (Stantec, 2010)

**Resemblance**

FO = Fuel oil fraction

WFO = Weathered fuel oil fraction

NRLO = No resemblance to products in the lube oil range

# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

POL COMPOUND

July 18, 2014

## 9.0 POL COMPOUND

### 9.1 Site Description

The POL Compound is located south of the main access road, immediately south of Pit No. 1/Helipad. Previous environmental reports revealed that the area was likely used as a former storage area for petroleum, oil and lubricants (POL). It is believed that waste materials at the Site may have been disposed of by pushing materials into the gully to the south.

Terrain at the POL Compound consists of a relatively flat area of exposed bedrock and soil, with a vegetated gully located further south. The area is located at a lower elevation than the other Former U.S. Military Site areas, allowing for water to pool in the area during rainfall events. Surface drainage (apparent groundwater flow direction) is expected to be south to southeast towards Old Dump Pond. Standing water and tar-like debris were previously observed in this area.

### 9.2 Description of Site Work

No additional delineation or remediation work was completed at the POL Compound between 2011 and 2013. A visual site inspection was performed to refine the estimated depth of impacts. Photos were taken of each area requiring remediation for future planning purposes and are provided in Appendix 8B.

### 9.3 Summary of Environmental Concerns at POL Compound

Based on the recommendations of the Phase II/III ESA, HHERA and RAP/RMP prepared by Stantec in 2010, remediation of TPH, antimony, chromium and lead-impacted soil is recommended at the POL Compound in order to obtain site-wide EPCs less than the applicable SSTLs. A summary of the estimated areas and volumes of soil requiring remediation is shown in Table 9.1. The depths of impacts provided in previous RAP tables were considered appropriate.

# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

POL COMPOUND

July 18, 2014

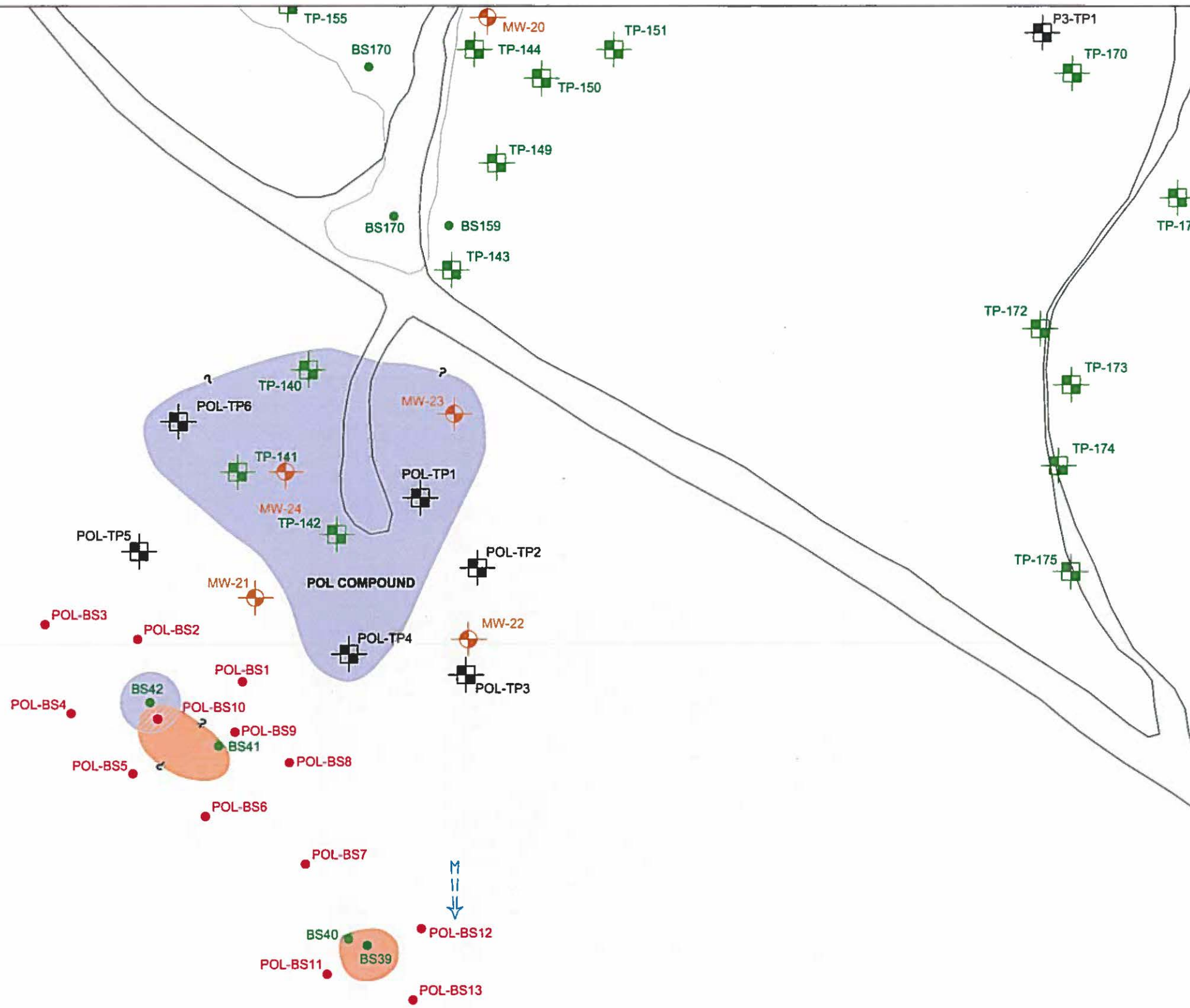
**Table 9.1 Summary of Soil Requiring Remediation – POL Compound**

Remedial Objectives	Other Issues Identified <sup>1</sup>	Sample Locations	Area (m <sup>2</sup> )	Depth (m)	Volume (m <sup>3</sup> )	Fully Delineated?	Maximum Concentration (mg/kg)	Priority Level <sup>2</sup>
TPH	-	TP-140, TP-141, TP-142, MW-24, POL-TP1, POL-TP4, POL-TP6	1,780	0.2	356	No	TPH: 25,000	3
TPH	-	BS42	100	0.2	20	Yes	TPH: 12,000	3
Antimony, Chromium, Lead	-	BS39	65	0.1	7	No	Antimony: 67 Chromium: 74 Lead: 2,100 Copper: 320	4
Antimony, Chromium, Lead	TPH	BS41, POL-BS10	120	0.1	12	Yes	Antimony: 120 Chromium: 650 Lead: 1,900 Copper: 790 TPH: 12,000	4
<p><b>Notes:</b></p> <p><sup>1</sup> Site data was screened against typical landfill acceptance criteria (1,000 mg/kg for TPH, 33 mg/kg and CCME Industrial guidelines for metals and PCBs). This information is required during the selection of disposal/treatment options. Exceedances of these values do not necessarily represent a risk to human or ecological health.</p> <p><sup>2</sup> Priority based on chemical of concern and location of impacts, with 1 being the highest priority and 4 being the lowest priority.</p>								

A site plan showing sample locations and the estimated areas of soil requiring remediation is provided in Appendix 9A (Drawing No. 121411777.610-EE-09). Photos showing the areas requiring soil remediation are provided in Appendix 9B. Laboratory analytical summary tables for COCs at the POL Compound (i.e., TPH/BTEX and metals) are provided in Appendix 9C.

# APPENDIX 9A

Site Plan – POL Compound



**LEGEND**

- TEST PIT (STANTEC 2010)
- TEST PIT (STANTEC 2009)
- MONITOR WELL (STANTEC 2009)
- BULK SOIL SAMPLE (STANTEC 2010)
- BULK SOIL SAMPLE (STANTEC 2009)
- UNKNOWN EXTENT OF IMPACTS
- INFERRED GROUNDWATER FLOW DIRECTION
- ESTIMATED AREA OF TPH IMPACTED SOIL REQUIRING REMEDIATION
- ESTIMATED AREA OF METALS (LEAD, ANTIMONY, CHROMIUM) IMPACTED SOIL REQUIRING REMEDIATION
- ESTIMATED AREA OF METALS AND TPH IMPACTED SOIL REQUIRING REMEDIATION

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

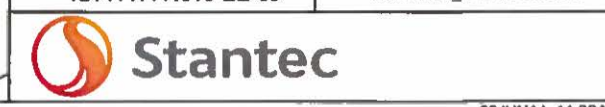
CLIENT:  
**NEWFOUNDLAND AND LABRADOR  
DEPARTMENT OF ENVIRONMENT  
AND CONSERVATION**

PROJECT TITLE:  
**ADDITIONAL DELINEATION AND UPDATED  
REMEDIAL ACTION PLAN, FORMER U.S.  
MILITARY SITE, HOPEDALE, NL**

DRAWING TITLE:  
**SITE PLAN - POL COMPOUND**

**Stantec Consulting Ltd.**

SCALE: 1:750	DATE: JUNE 2, 2014	REV. No.: 0
DRAWN BY: N.M.	EDITED BY: -	CHECKED BY: AR
DRAWING No.: 121411777.610-EE-09		CAD FILE: 121411777_610-EE-09.DWG





## APPENDIX 9B

Site Photos – POL Compound

Site Photos – POL Compound



Photo 1. Area of TPH-impacted soil (BS237, BBS239, BS240, BS241, P3-TP3, P3-TP4, P3-TP6, P3-TP7, P3-TP8, P3-BS3 and P3-BS4), looking south.



Photo 2. Area of TPH-impacted soil (BS237, BBS239, BS240, BS241, P3-TP3, P3-TP4, P3-TP6, P3-TP7, P3-TP8, P3-BS3 and P3-BS4), looking southeast.

Site Photos – POL Compound



Photo 3. Area of TPH-impacted soil (BS237, BBS239, BS240, BS241, P3-TP3, P3-TP4, P3-TP6, P3-TP7, P3-TP8, P3-BS3 and P3-BS4), looking east.



Photo 4. Surficial debris at the POL Compound.

Site Photos – POL Compound



Photo 5. Area of TPH, antimony, chromium and lead-impacted soil requiring remediation (BS41 and POL-BS10), looking southeast.



Photo 6. Sample BS41.

Site Photos – POL Compound



Photo 7. Area of antimony, chromium and lead-impacted soil requiring remediation (BS39), looking southeast.

## APPENDIX 9C

Analytical Summary Tables – POL Compound

Table 9-1 Results of Laboratory Analysis of TPH/BTEX in Soil - POL Compound  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Sample ID	Sample Depth (m)	BTEX Parameters (mg/kg)				Total Petroleum Hydrocarbons (mg/kg)				Resemblance	
		Benzene	Toluene	Ethyl-benzene	Xylenes	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>16</sub> (Fuel Range)	C <sub>16</sub> -C <sub>21</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)		Modified TPH - Tier I <sup>3</sup>
	RDL	0.03	0.03	0.03	0.05	3	15	15	20	-	
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	
	Tier I RBLS <sup>1</sup>	0.099	77	30	8.8	-	-	-	270	-	
	SSTL <sup>2</sup>	-	-	-	-	-	-	-	1,700	-	
<b>2009 Sampling - Stantec</b>											
TP140-BS1	0.2 - 0.3	<0.03	<0.03	<0.03	<0.05	<3	650	1,800	<b>2,400</b>	FO, LO	
TP141-BS1 <sup>4</sup>	0.1 - 0.2	<0.04	1.2	<0.03	0.15	-	-	-	<b>25,000</b>	WFO, LO	
TP142-BS1	0.2 - 0.3	<0.03	<0.03	<0.03	0.5	67	2,600	10,000	<b>13,000</b>	FO, LO	
BS4 <sup>2</sup>	0.0 - 0.13	<0.03	<0.03	<0.03	<0.05	<3	1,700	10,000	<b>12,000</b>	WFO, LO	
MW21-SS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	<3	250	1,100 (150)	<b>1,300</b> (200)	WFO, LO	
MW24-SS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	36	5,500	15,000 (150)	<b>21,000</b> (200)	WFO, LO	
<b>2010 Sampling - Stantec</b>											
POL-TP1 BS1	0.0 - 0.3	<0.03	0.37	<0.03	<0.05	<3	7,600	3,100	50,000	<b>60,000</b>	FO, LO
POL-TP2 BS1	0.0 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	260	310	720	<b>1,300</b>	WFO, NRLO
POL-TP3 BS1	0.0 - 0.1	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	69	69	NRLO
POL-TP4 BS1	0.0 - 0.15	<0.03	0.09	<0.03	<0.05	<3	2,400	1,200	13,000	<b>17,000</b>	WFO, LO
POL-TP5 BS1	0.0 - 0.25	<0.03	<0.03	<0.03	<0.05	<3	96	40	300	440	WFO, NRLO
POL-TP6 BS1	0.0 - 0.3	<0.03	<0.03	<0.03	<0.05	170	2,100	630	12,000	<b>15,000</b>	WFO, LO
POL-BS2	0.0 - 0.1	<0.03	0.06	<0.03	<0.05	<3	<10	85	650	<b>730</b>	WFO, LO
POL-BS21 (POL-BS2 Field Dup.)	0.0 - 0.1	<0.03	0.15	<0.03	0.09	<3	<10	76	560	<b>630</b>	WFO, LO
POL-BS4	0.0 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	<15	<20	
POL-BS4 Lab-Dup	0.0 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	<15	-	-
POL-BS5	0.0 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	<10	<10	45	45	NRLO
POL-BS9	0.0 - 0.1	<0.03	1.1	<0.03	<0.05	<3	<10	14	320	<b>340</b>	LO

**Notes:**  
 1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBLS) for a residential site with non-potable groundwater and coarse grained soil, fuel oil impacts (July 2012)  
 2 = SSTL calculated for TPH at the Former Radar Site (Stantec, 2010)  
 3 = Modified TPH - Tier I does not include BTEX  
 4 = TPH Fractionation results  
 RDL = Reportable Detection Limit for routine analysis  
 < # = Not detected above RDL noted  
 # (#) = Elevated RDL shown in brackets  
 "-" = indicates value is not available or does not apply  
**Bold/Italics** = Value exceeds generic criteria (i.e., Tier I RBLS) for a residential site with potable groundwater, coarse grained soil and fuel oil impacts  
 Shaded = Value exceeds SSTL calculated for TPH at Former Radar Site (Stantec, 2010)

**Resemblance**

FO = Fuel oil fraction

WFO = Weathered fuel oil fraction

LO = Lube oil fraction

FO/LO = One product in fuel oil/lube oil range

NRPP = No resemblance to petroleum products

NRLO = No resemblance to products in the lube oil range

Table 9-2 Results of Laboratory Analysis of Available Metals in Soil - POL Compound  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Parameters	RDL	Units	Generic Criteria <sup>1</sup>	SSTL <sup>2</sup>	2009 Sampling - Stantec			2010 Sampling - Stantec							
					BS39	BS41	TP142-BS1	POL-BS6	POL-BS7	POL-BS8	POL-BS81 (POL-BS8 Field Dup.)	POL-BS10	POL-BS11	POL-BS12	POL-BS13
					Sample Depth (m)				0.0 - 0.08	0.0 - 0.10	0.2 - 0.3	0.0 - 0.1	0.0 - 0.1	0.0 - 0.15	Not recorded
Aluminum	10	mg/kg	-	-	7,300	9,100	8,500	14,000	15,000	7,000	6,900	25,000	5,400	6,300	6,400
Antimony	2	mg/kg	20	5	<b>67</b>	<b>120</b>	2	<2	4	6	5	<2	<2	<2	<2
Arsenic	2	mg/kg	12	-	<b>15</b>	9	<2	<2	<2	<2	<2	<2	<2	<2	<2
Barium	5	mg/kg	500	-	340	300	150	54	72	100	110	70	27	19	17
Beryllium	2	mg/kg	4	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bismuth	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Boron	5	mg/kg	-	-	14	27	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	0.3	mg/kg	10	1.3	5.4	5.6	0.8	<0.3	0.3	0.7	0.9	<0.3	<0.3	<0.3	<0.4
Chromium	2	mg/kg	64	20	<b>74</b>	<b>350</b>	34	26	27	21	19	<b>650</b>	22	14	14
Cobalt	1	mg/kg	50	-	11	17	5	8	9	8	7	25	5	5	5
Copper	2	mg/kg	63	-	<b>320</b>	<b>790</b>	40	62	<b>69</b>	<b>130</b>	<b>150</b>	6	27	18	14
Iron	50	mg/kg	-	-	100,000 (500)	94,000 (500)	10,000	19,000	22,000	27,000	26,000	25,000	9,200	9,500	10,000
Lead	0.5	mg/kg	140	75	<b>2,100</b>	<b>1,900</b>	51	51	130	<b>160</b>	120	1	46	18	8
Lithium	2	mg/kg	-	-	5	6	7	10	11	7	7	35	6	6	6
Manganese	2	mg/kg	-	-	660	470	95	200	220	220	240	320	98	110	110
Mercury	0.1	mg/kg	6.6	-	0.7	0.3 (0.2)	0.4	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2
Molybdenum	2	mg/kg	10	-	10	<b>12</b>	<2	<2	3	<2	<2	<2	<2	<2	<3
Nickel	2	mg/kg	50	-	<b>63</b>	<b>110</b>	17	19	23	27	22	<b>340</b>	19	12	12
Rubidium	2	mg/kg	-	-	8	5	4	11	14	6	6	63	5	3	4
Selenium	2	mg/kg	1	-	<2	<2	<2	<5	<5	<5	<5	<5	<5	<5	<6
Silver	0.5	mg/kg	20	-	1.3	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6
Strontium	5	mg/kg	-	-	22	46	10	13	14	13	14	6	6	8	9
Thallium	0.1	mg/kg	1	-	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.2
Tin	2	mg/kg	50	-	<b>230</b>	<b>550 (20)</b>	18	24	30	31	41	<2	5	<2	3
Uranium	0.1	mg/kg	23	-	0.3	0.5	0.7	0.9	0.9	0.3	0.3	<0.1	0.3	0.5	0.4
Vanadium	2	mg/kg	130	-	20	28	18	30	30	17	16	55	13	20	17
Zinc	5	mg/kg	200	-	<b>1,300</b>	<b>1,700</b>	160	67	150	<b>340</b>	<b>340</b>	83	60	31	28

Notes:

1 = CCME Canadian Soil Quality Guidelines (CSQGs) for a Residential/Parkland Site (CCME on-line 2014)

2 = SSTL calculated for metals at the Former Radar Site (Stantec, 2010)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

# (#) = Elevated RDL shown in brackets

"-" = indicates value is not available or does not apply



# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

OLD DUMP POND

July 18, 2014

## 10.0 OLD DUMP POND

### 10.1 Site Description

The Old Dump Pond area comprises a pond and land located east of the pond. The area is located downgradient of Reservoir Lake on the west side of the military base road. The shore of the pond is heavily vegetated with some bedrock outcroppings. During previous years of remediation, a significant amount of buried debris (steel pipes, cables and beams, vehicle parts, glass bottles and rusted drums) was encountered during excavation in this area. It has been reported that during demolition of the military base, the pond was used for the disposal of various metal wastes and debris. The findings of a previous geophysical survey showed that these wastes were primarily deposited at the end of the access road and along the northeast shoreline of the pond (Agra Earth & Environmental, 1998).

The Old Dump Pond area is bordered by a relatively new area of residential development constructed on an elevated gravel pad to the east, by the waters of Old Dump Pond to the southwest and by undeveloped land to the northwest. The area is accessible via a narrow gravel access road to the northeast. Terrain in the vicinity of the Old Dump Pond site slopes towards the pond which discharges to the southeast into Hopedale Harbour via a stream. Surface drainage (apparent groundwater flow direction) near the terrestrial portion of the Old Dump Pond site is expected to be towards the pond.

### 10.2 Description of Site Work

In 2011, 2012 and 2013, PCB-impacted soil was removed from the Old Dump Pond area. Site remediation was carried out by RJG of St. John's, NL on behalf of NLDEC and was supervised by Stantec personnel, who maintained a record of activities while on-site and collected confirmatory soil samples. A total of 1,100 one-tonne capacity enviro-bags of PCB-impacted soil were removed from the remedial excavation and from the upper 0.05 to 0.15 m of the areas used to temporarily store filled bags and metal (refer to Drawing No. 121411777.610-EE-10 in Appendix 10A). A total of 93.6 tonnes of metal was unearthed during excavation in Years 1 to 3 of the Implementation of the RAP and was transported to the Newco Metal and Auto Recycling Facility in St. John's, NL for recycling. The majority of this metal was unearthed in the Old Dump Pond area.

The northeast portion of the remedial excavation at Old Dump Pond was terminated on bedrock, which ranged in depth from 0 mbgs (i.e., exposed) to 1.8 mbgs. The southwest portion of the remedial excavation was terminated on a clay layer which was encountered at a depth of approximately 1.2 mbgs. Buried metal was generally encountered above the clay layer.

A strip of soil remaining between the remedial excavation and the pond contains concentrations of PCBs in exceedance of the applicable SSTL of 9 mg/kg. Soil removal was not possible in this area due to the proximity to the pond. It was recommended that this area be

## **ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR**

OLD DUMP POND

July 18, 2014

assessed during the development of a remedial action/risk management plan for the pond sediments (estimated 30 m<sup>3</sup> of PCB-impacted soil). The maximum PCB concentration reported in this area was 290 mg/kg. PCBs were detected in pond sediments at concentrations up to 90 mg/kg. Remedial options for pond sediments were discussed in a separate report (refer to Stantec, 2014d). For the remainder of the Old Dump Pond area, PCB concentrations in soil remaining on-site range from non-detect to 5.6 mg/kg (ODP-TP BS1), which are below the applicable SSTL of 9 mg/kg. Full details of the 2013 site remediation program along with the locations and analytical results of all confirmatory soil samples are provided in the *Implementation of Remedial Action Plan – Year 3, Former U.S. Military Site and Residential Subdivision, Hopedale, Labrador* report (Stantec, 2014b). With the exception of the strip of soil located between the southwestern limits of the excavation and the pond, no further terrestrial remediation for PCB-impacted soil in the Old Dump Pond area is deemed necessary.

No further delineation of metals impacts was conducted at Old Dump Pond between 2011 and 2013.

### **10.3 Summary of Environmental Concerns at Old Dump Pond**

Based on the recommendations of the Phase II/III ESA, HHERA and RAP/RMP prepared by Stantec in 2010, remediation of PCB and antimony-impacted soil is recommended at Old Dump Pond in order to obtain maximum site concentrations less than the applicable SSTLs. Concentrations of several metals including copper, mercury, molybdenum, and nickel were elevated in one test pit (TP-229) from the Old Dump Pond area in 2009 but were not elevated in any other samples collected from the Residential Area. In addition, concentrations of antimony and lead were particularly elevated in this test pit. During excavation of the test pit, metal debris was noted to be present. This test pit was considered an anomaly for several metals. Since the sample could skew the EPCs for metals such as antimony and lead, the analytical results from this test pit were not included in the 2010 risk assessment screening for COCs. Instead, recommendations were made to remove the soil and associated debris from this area.

Upon review of the remaining areas requiring remediation for metals, it was discovered that the 2009 test pit locations shown on previous site plans were incorrect. The 2009 test pits were shown in the “proposed” test locations rather than the “actual” test locations. This error does not affect the PCB-remediated areas, as PCB impacts were identified based on the 2009 monitor well and 2010 test pit sample locations and extensive sampling was carried out throughout the Old Dump Pond site during remediation. The 2009 test pit locations have been adjusted on Drawing No. 121411777.610-EE-10 in Appendix 10A to reflect actual test locations. The area surrounding test pit TP-233 has been remediated to a depth of 1.2 mbgs; however, metals impacts were identified in sample TP233-BS2, collected between 1.8 and 2.8 mbgs. Remediation in this area would require the removal of soil beneath the upper layer of clean backfill. Further remediation of PCB and antimony-impacted soil is recommended at Old Dump Pond.

# ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, LABRADOR

OLD DUMP POND  
July 18, 2014

A summary of the estimated areas and volumes of soil remaining on-site requiring remediation is shown in Table 10.1.

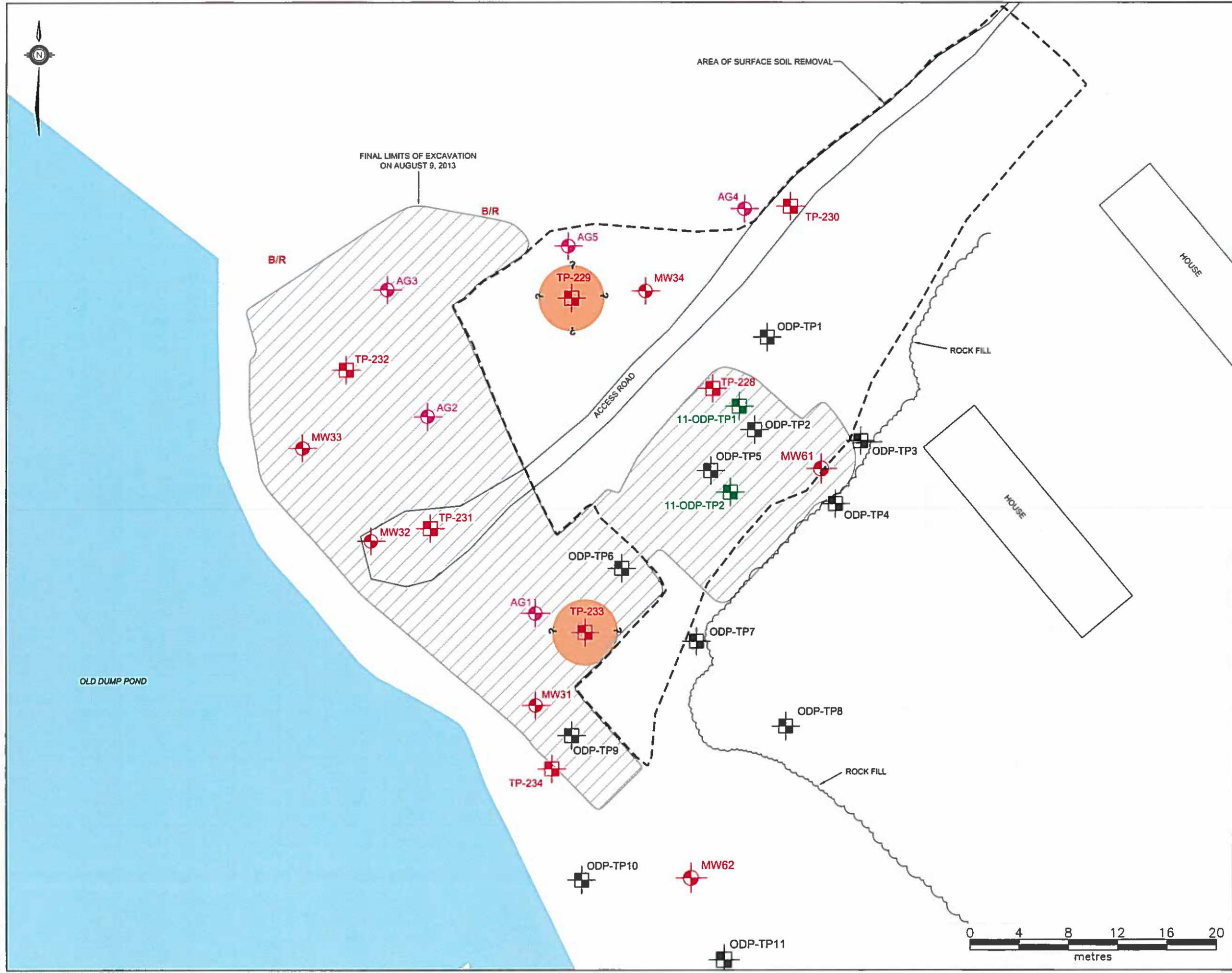
**Table 10.1 Summary of Soil Requiring Remediation - Old Dump Pond**

Remedial Objectives	Other Issues Identified <sup>1</sup>	Sample Locations	Area (m <sup>2</sup> )	Depth (m)	Volume (m <sup>3</sup> )	Fully Delineated?	Maximum Concentration (mg/kg)	Priority Level <sup>2</sup>
PCB	TPH	12-ODP-BS7, 12-ODP-BS8	30	1.0	30	Yes	PCB: 290 TPH: 1,300	TBD
Antimony	Cadmium, Copper, Chromium, Lead, Mercury, Molybdenum, Nickel, Tin, Selenium, Zinc	TP-229	25	0.25	13	No	Antimony: 99 Cadmium: 15 Chromium: 68 Copper: 2,500 Lead: 8,100 Mercury: 67 Molybdenum: 23 Nickel: 110 Selenium: 7 Tin: 420 Zinc: 3,400	4
Antimony	Cadmium, Copper, Chromium, Lead, Nickel, Tin, Zinc	TP-233	25	1.6	13	No	Antimony: 42 Cadmium: 11 Chromium: 100 Copper: 380 Lead: 590 Nickel: 87 Tin: 180 Zinc: 2,700	4
<p><b>Notes:</b></p> <p><sup>1</sup> Site data was screened against typical landfill acceptance criteria (1,000 mg/kg for TPH, 33 mg/kg and CCME Industrial guidelines for metals and PCBs). This information is required during the selection of disposal/treatment options. Exceedances of these values do not necessarily represent a risk to human or ecological health.</p> <p><sup>2</sup> Priority based on chemical of concern and location of impacts, with 1 being the highest priority and 4 being the lowest priority.</p>								

The soil sample locations and estimated areas of soil requiring remediation are shown on Drawing No. 121411777.610-EE-10 in Appendix 10A. Photos showing the areas requiring soil remediation are provided in Appendix 10B. Laboratory analytical summary tables for COCs at Old Dump Pond (i.e., PCBs and metals) are provided in Appendix 10C.

# APPENDIX 10A

Site Plan – Old Dump Pond



**LEGEND**

- TEST PIT (STANTEC 2011)
- TEST PIT (STANTEC 2010)
- TEST PIT (STANTEC 2009)
- MONITOR WELL (STANTEC 2009)
- B/R** EXPOSED BEDROCK
- ESTIMATED AREA OF METALS (ANTIMONY, CADMIUM, CHROMIUM AND LEAD) IMPACTED SOIL REQUIRING REMOVAL
- APPROXIMATE EXTENT OF SOIL REMOVED

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

CLIENT:  
**NEWFOUNDLAND AND LABRADOR DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

PROJECT TITLE:  
**ADDITIONAL DELINEATION AND UPDATED REMEDIAL ACTION PLAN, FORMER U.S. MILITARY SITE, HOPEDALE, NL**

DRAWING TITLE:  
**SITE PLAN - OLD DUMP POND**

**Stantec Consulting Ltd.**

SCALE: 1:300	DATE: JUNE 2, 2014	REV. No. 0
DRAWN BY: N.M.	EDITED BY: -	CHECKED BY: AR
DRAWING No: <b>121411777.610-EE-10</b>		CAD FILE: 121411777_610-EE-10.DWG

## APPENDIX 10B

Site Photos – Old Dump Pond

Site Photos – Old Dump Pond



Photo 1. Old Dump Pond remedial excavation on July 2, 2013, looking northwest.



Photo 2. Buried metal removed from the PCB remedial excavation at Old Dump Pond.

Site Photos – Old Dump Pond



Photo 3. Approximate location of metals (antimony) impacted soil requiring remediation (TP-229), looking northwest.



Photo 4. Approximate location of metals (antimony) impacted soil requiring remediation at depth (TP-233), looking east.



Site Photos – Old Dump Pond



Photo 5. Test pit TP-229 during excavation in 2009.



Photo 6. Test pit TP-229 during excavation in 2009.

Site Photos – Old Dump Pond



Photo 7. Test pit TP-233 during excavation in 2009.



Photo 8. Test pit TP-233 during excavation in 2009.

## APPENDIX 10C

Analytical Summary Tables – Old Dump Pond

Table 10-1 Results of Laboratory Analysis of PCBs in Soil - Old Dump Pond  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.610

Sample ID	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)	Comments
	RDL	0.05	-
	Units	mg/kg	-
	Generic Criteria <sup>1</sup>	1.3	-
	SSTL <sup>2</sup>	9	-
<b>2009 Sampling - Stantec</b>			
MW31-SS2	1.5 - 2.1	<0.05	-
MW32-SS2	0.6 - 1.2	<b>25</b>	Soil removed
MW33-SS2	0.6 - 1.2	<b>4.0</b>	-
MW61-SS1	0.0 - 0.5	<b>29</b>	Soil removed
MW62-SS3	1.2 - 1.8	0.2	-
AG2-FS2	1.5	0.54	-
AG4-FS1	0.3	1.1	-
<b>2010 Sampling - Stantec</b>			
ODP-TP1 BS1	0 - 0.15	<b>5.6</b>	-
ODP-TP2 BS1	0 - 0.3	<b>50</b>	Soil removed
ODP-TP3 BS1	0 - 0.5	<0.05	-
ODP-TP4 BS1	0 - 0.1	0.23	-
ODP-TP6 BS1	0 - 0.5	<b>8.9</b>	-

**Notes:**

1 = CCME Canadian Soil Quality Guidelines (CSQGs) for a Residential/Parkland Site (CCME on-line 2014)

2 = SSTL calculated for PCBs at the Residential Area of Hopedale

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

**Bold/Italics** = Value exceeds applicable generic criteria (i.e., CCME CSQG)

**Shaded** = Value exceeds SSTL calculated for PCBs at the Residential Area of Hopedale (Stantec, 2010)

Table 10-2 Results of Laboratory Analysis of Available Metals in Soil -  
 Old Dump Pond  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Parameters	RDL	Units	Generic Criteria <sup>1</sup>	SSTL <sup>2</sup>	2009 Sampling - Stantec							
					TP227-BS1	TP228-BS2	TP229-BS1	TP230-BS2	TP231-BS2	TP233-BS2	MW31-SS3	MW34-SS1
					Sample Depth (m)	0.0 - 0.3	1.8 - 2.4	0.0 - 0.5	0.6	0.8 - 1.0	1.8 - 2.8	2.1 - 2.7
Aluminum	10	mg/kg	-	-	1,600	7,100	12,000	9,800	7,100	9,100	18,000	5,600
Antimony	2	mg/kg	20	30	<2	<2	<b>99</b>	<2	16	<b>42</b>	<2	<2
Arsenic	2	mg/kg	12	-	<2	<2	10	<2	5	6	<2	<2
Barium	5	mg/kg	500	-	11	34	240	52	51	120	55	45
Beryllium	2	mg/kg	4	-	<2	<2	<2	<2	<2	<2	<2	<2
Bismuth	2	mg/kg	-	-	<2	<2	18	<2	<2	<2	<2	<2
Boron	5	mg/kg	-	-	<5	<5	31	<5	9	21	<5	<5
Cadmium	0.3	mg/kg	10	-	<0.3	0.4	<b>15</b>	0.9	7.2	<b>11</b>	<0.3	<0.3
Chromium	2	mg/kg	64	-	15	14	<b>68</b>	28	33	<b>100</b>	31	12
Cobalt	1	mg/kg	50	-	<1	2	20	4	8	13	9	4
Copper	2	mg/kg	63	-	<2	5	<b>2,500</b>	56	<b>160</b>	<b>380</b>	28	16
Iron	50	mg/kg	-	-	2,900	7,600	96,000	11,000	61,000	77,000	19,000	8,900
Lead	0.5	mg/kg	140	-	0.9	4.3	<b>8,100</b>	22	<b>250</b>	<b>590</b>	5.1	22
Lithium	2	mg/kg	-	-	<2	3	4	3	4	5	16	6
Manganese	2	mg/kg	-	-	30	71	860	93	270	380	180	140
Mercury	0.1	mg/kg	6.6	-	<0.1	<0.1	<b>67</b>	0.4	0.5	1.9	<0.1	<0.1
Molybdenum	2	mg/kg	10	-	<2	<2	<b>23</b>	<2	4	9	<2	<2
Nickel	2	mg/kg	50	-	6	6	<b>110</b>	10	<b>51</b>	<b>87</b>	27	12
Rubidium	2	mg/kg	-	-	5	<2	5	2	4	7	16	4
Selenium	2	mg/kg	1	-	<2	<2	<b>7</b>	<2	<2	<2	<2	<2
Silver	0.5	mg/kg	20	-	<0.5	<0.5	9.5	<0.5	0.9	2.9	<0.5	<0.5
Strontium	5	mg/kg	-	-	<5	14	22	16	15	50	35	8
Thallium	0.1	mg/kg	1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Tin	2	mg/kg	50	-	<2	2	<b>420</b>	4	<b>320</b>	<b>180</b>	<2	<2
Uranium	0.1	mg/kg	23	-	<0.1	0.2	0.4	0.4	0.5	0.6	1.2	0.3
Vanadium	2	mg/kg	130	-	6	14	42	15	32	43	36	13
Zinc	5	mg/kg	200	-	7	17	<b>3,400</b>	<b>400</b>	<b>1,300</b>	<b>2,700</b>	50	120

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

2 = SSTL calculated for antimony at the Residential Area of Hopedale (Stantec, 2010)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

**Bold/Italics** = Value exceeds generic criteria (i.e., CCME CSQG)

Shaded = Value exceeds SSTL calculated for PCBs at Former Radar Site (Stantec, 2010)

Table 10-2 Results of Laboratory Analysis of Available Metals in Soil -  
 Old Dump Pond  
 Additional Delineation and Updated Remedial Action Plan  
 Former U.S. Military Site, Hopedale, Labrador  
 Project No. 121411777.600

Parameters	RDL	Units	Generic Criteria <sup>1</sup>	SSTL <sup>2</sup>	2010 Sampling - Stantec					
					ODP-TP2 BS1	ODP-TP3 BS1	ODP-TP4 BS1	ODP-TP5 BS1	ODP-TP6 BS1	ODP-TP9 BS1
					Sample Depth (m)					
					0.0 - 0.3	0.0 - 0.5	0.0 - 0.1	0.0 - 0.2	0.0 - 0.5	0.0 - 0.3
Aluminum	10	mg/kg	-	-	6,700	6,700	5,900	6,400	7,900	5,200
Antimony	2	mg/kg	20	30	<2	<2	<2	<2	11	6
Arsenic	2	mg/kg	12	-	<2	<2	<2	<2	<2	<2
Barium	5	mg/kg	500	-	24	35	160	19	87	38
Beryllium	2	mg/kg	4	-	<2	<2	<2	<2	<2	<2
Bismuth	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2
Boron	5	mg/kg	-	-	<5	<5	<5	<5	7	<5
Cadmium	0.3	mg/kg	10	-	0.7	0.3	<0.3	<0.3	7	1
Chromium	2	mg/kg	64	-	17	14	16	12	34	13
Cobalt	1	mg/kg	50	-	5	4	5	4	7	4
Copper	2	mg/kg	63	-	33	14	17	22	<b>330</b>	<b>65</b>
Iron	50	mg/kg	-	-	12,000	9,200	12,000	8,600	44,000	14,000
Lead	0.5	mg/kg	140	-	74	10	18	7.9	<b>570</b>	140
Lithium	2	mg/kg	-	-	6	6	16	7	5	6
Manganese	2	mg/kg	-	-	140	120	220	120	320	160
Mercury	0.1	mg/kg	6.6	-	0.2	0.1	<0.1	0.2	0.8	0.2
Molybdenum	2	mg/kg	10	-	<2	<2	<2	<2	5	<2
Nickel	2	mg/kg	50	-	15	13	11	12	44	12
Rubidium	2	mg/kg	-	-	5	4	18	5	4	4
Selenium	2	mg/kg	1	-	<2	<2	<2	<2	<2	<2
Silver	0.5	mg/kg	20	-	<0.5	<0.5	<0.5	<0.5	0.8	<0.5
Strontium	5	mg/kg	-	-	7	8	10	6	15	7
Thallium	0.1	mg/kg	1	-	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Tin	2	mg/kg	50	-	11	<2	<2	<2	<b>93</b>	39
Uranium	0.1	mg/kg	23	-	0.5	0.5	0.3	0.6	0.8	0.4
Vanadium	2	mg/kg	130	-	20	16	19	15	16	13
Zinc	5	mg/kg	200	-	81	100	46	31	<b>1,200</b>	180

**Notes:**

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

2 = SSTL calculated for antimony at the Residential Area of Hopedale (Stantec, 2010)

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