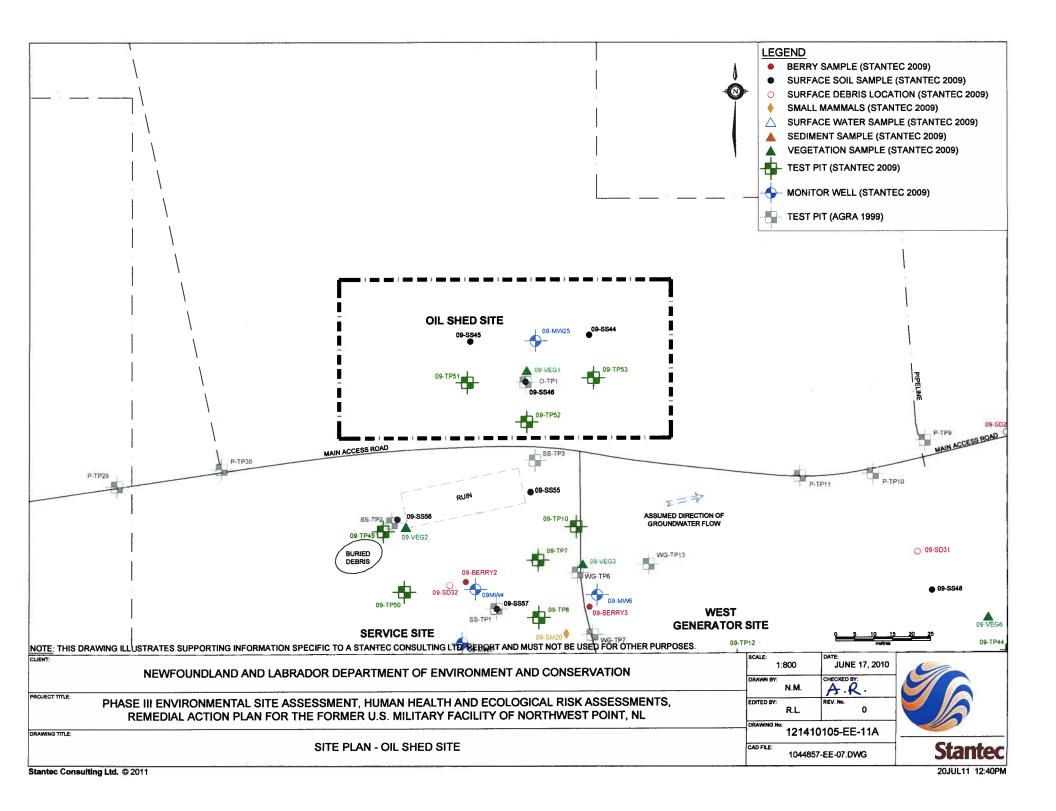
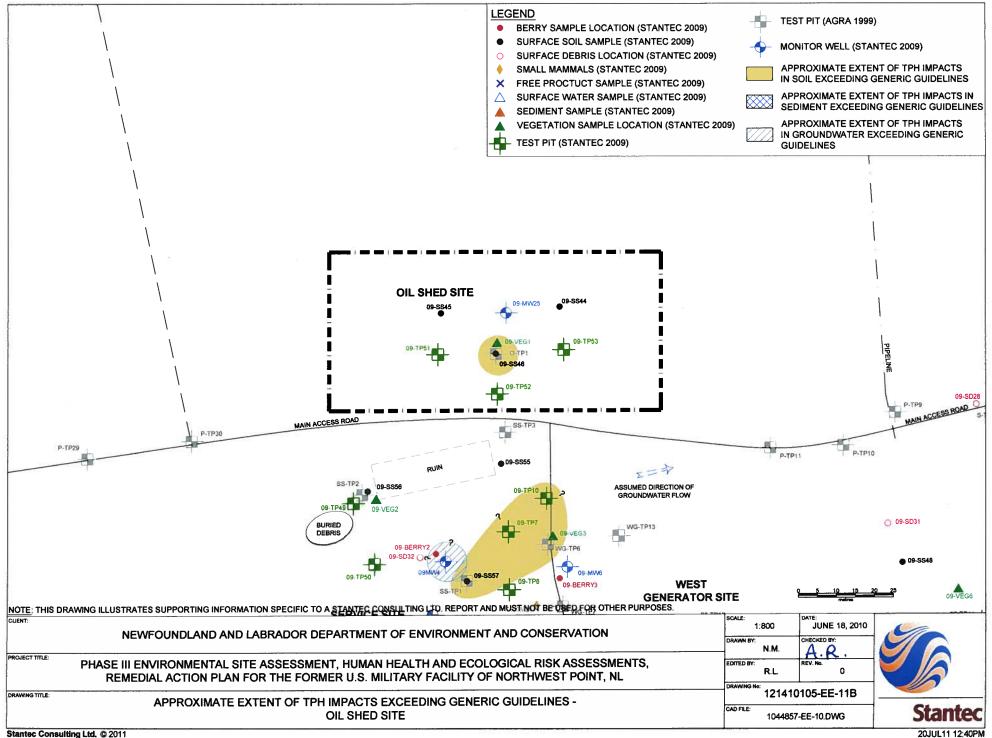
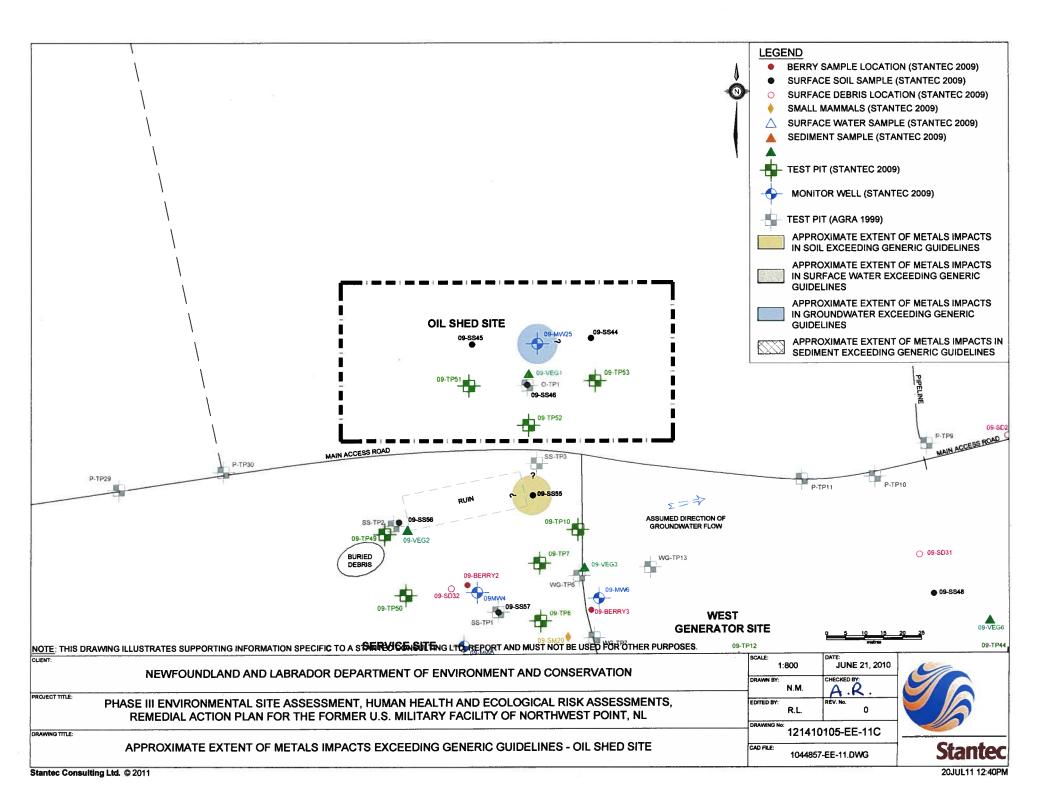
## **Appendix 11a**

Site Drawings







## **Appendix 11b**

Sample Coordinates

Sample Coordinates - Oil Shed Site Phase III ESA, HHERA and RAP Former U.S Military Facility, Northwest Point, NL Stantec Consulting Ltd. Project No. 121410105

Sample ID	Coordinate	es (NAD27)
Sample ID	Easting	Northing
	TEST PITS	
09-TP51	694154	5931227
09-TP52	694163	5931216
09-TP53	694175	5931228
	MONITOR WELLS	
09-MW25	694161	5931241
	SURFACE SOIL	
09-SS44	694170	5931231
09-SS45	694157	5931243
09-SS46	694162	5931231
	VEGETATION	
09-VEG1	694162	5931224

## Appendix 11c

Test Pit Records and Monitor Well Records

		<b>NL</b> Department of Environment and Conservati		RE	CO	RD							09-TF	051	
PI	ROJECT _	Phase III ESA, HHRA & ERA, Former US Milit Northwest Point, NL	ary I	Faci	lity					_	T PIT NO DJECT N		121410		
	OCATION ATES (mm	<b>a - a a</b>	TER L	EV	EL _	1.8	m	8	8-7-09	_	TUM _				
						SAMF			(0)		CHEMICA		'SIS (ppm	)	
DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	ТҮРЕ	NUMBER	HYDROCARBON ODOUR	OTHER TESTS	PID READINGS (ppm)	ТРН	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	
- 0 - - -		Loose to compact, brown, SAND with gravel (SP)	2.0		BS	1	0		2.3	_	-	-	-	-	-
- - - - - - 1 -				r			-								
- - - -		Compact, grey, SAND with silt (SP-SM); trace clay		•			-								
- - - 2 -				₽	BS	2	0		5.1	nd	nd	nd	nd	nd	
		End of Test Pit													-
-		Very slow groundwater seepage observed at 1.8 m depth.													
- 3 - - - -		Bedrock not encountered.													-
- - - 4 -															-
-															-
 - - -															
- 5 -				<u> </u>	<u>.                                    </u>	I	<u> </u>	<u> </u>			<u>.                                    </u>	I	I	L	<u> </u>

	Sta			RE	ECO	RD									
Р	LIENT ROJECT _	NL Department of Environment and Conserva Phase III ESA, HHRA & ERA, Former US Mil		Faci	lity					_	T PIT N		09-TF 121410		
	OCATION DATES (mm		ATER I	EV	EL _	2.6	m	8	8-7-09	_	JECT N	lo	121410	105	
						SAMF			(0)		CHEMICA	AL ANALY	′SIS (ppm	)	
DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	ТҮРЕ	NUMBER	HYDROCARBON ODOUR	OTHER TESTS	PID READINGS (ppm)	НДТ	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	
- 0 -				-											_
	-	Compact, brown, SAND with gravel (SP); some roots and rootlets, occasional cobbles			BS	1	0		1.4	-	-	-	-	-	-
- 1 -	-		Side Side S												
	-	Compact to dense, grey, SILT with sand (ML)	;]/ ;]]]		BS	2	0		1.4	nd	nd	nd	nd	nd	- - -
- 2 -		trace clay													
- 3 -	-	End of Test Pit													•
	-	Slow groundwater seepage observed at 2.6 m depth.												-	
	-	Bedrock not encountered.												-	
- 4 -															-
	-														- -
	-														
- 5		I		<u> </u>	<u> </u>	<u>I</u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>		_

C	Sta	NL Department of Enviro Phase III ESA, HHRA &		n			RD				- TES	T PIT No		09-TP	
L	OCATION	Northwest Point, NL	~				2		6	7.00	_	JECT N	lo	121410	105
D.	ATES (mm	-dd-yy): DUG <b>8-7-0</b>	WAT	ER L	EVE		2m		<u>s</u>	<b>6-7-09</b>	_ DA1				
_	Ê			L L			SAMP			ю К					
DEPTH (m)	ELEVATION (m)	DESCRIPT	TION	STRATA PLOT	WATER LEVEL	ТҮРЕ	NUMBER	HYDROCARBON ODOUR	OTHER TESTS	PID READINGS (ppm)	НЧТ	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
- 0 -		~													
-		Compact, brown, SAND	with gravel (SP)	> 0 > (		BS	1	0		29	-	-	-	-	
 - - - 1 - - - -				0 0 0 0 0 0											
				>											
-		Compact to dense, grey, S trace clay	SILT with sand (ML);		Σ										
- 2 - - - -					- <u>-</u>	BS	2	0		0.0	nd	nd	nd	nd	nd
		End of T Very slow groundwater so 2.0 m depth.													
- 3 - - - -		Bedrock not encountered.													-
															-
- 4 - - - -															
 - - - -															
- 5 -				<u>ı</u>	<u>. 1</u>		I <u> </u>		<u>.                                     </u>						I

CI	LIENT	NL Department of Environment and Phase III ESA, HHRA & ERA, For Northwest Point, NL		BOREHOI PAGE PROJECT DRILLINC SIZE	L of No	<u>1</u> <u>121410105</u> OD Auger								
		-dd-yy): BORING <b>8-12-09</b>				WA	TER LE	VEL <u>1</u> .	.22m	8-12	2-09	DATUM		
DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	ТҮРЕ	NUMBER	AMPLES	N-VALUE OR RQD %	HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)		WELL INSTRUCTION DETAILS 61 m STICK UP
							mm						⋳₩⋼	CAST IRON WELL HEAD
- 0 -		Light and dark brown, SAND (SP); some cobbles	° C		SS	1	255	10	0		0.0	-		BENTONITE
- 1 -		Grey, SILT (ML) Dark brown, SAND (SP); some		Ţ	SS	2	355	10	0	М	0.0	-		
		Cobbles Brown, SAND (SP)		- <u>-</u>	SS	3	205	4	0		0.0	250		50 mm DIAMETER
- 2 -		Grey, silty SAND (SM)		-	SS	4	305	6	0	М	0.0	-		SCREEN IN No. 2 SILICA SAND PACK
- 3 -				-	SS	5	305	25	0	М	0.0	-		
				•										END CAP
- 4 - 5 - 6 - 7 - 8 - 7 - 8 - 9 - 10-		End of Borehole												
		WELL 8/5/11 11:02:02 AM												

# Appendix 11d

Laboratory Analytical Results Summary Tables

## Table 11.1 Results of Laboratory Analysis of TPH/BTEX in Soil - Oil Shed Site Phase III ESA, HHERA and RAP Former U.S Military Facility, Northwest Point, NL Stantec Consulting Ltd. Project No. 121410105

Sample Location	Sample Depth (m)	Benzene	Toluene	Ethyl- benzene	Xylenes	TPH Purgeable ( <c<sub>10)</c<sub>	TPH Extractable (C <sub>10</sub> -C <sub>32</sub> )	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>21</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)	Modified TPH - Tier I <sup>2</sup>	Resemblance
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
	Tier I RBSLs <sup>1</sup>	0.16	14	58	17	-	-	-	-	-	690	-
					19	99 Sampling (A	AGRA)					
O-TP1	0.5	<0.002	< 0.002	<0.002	<0.002	0.35	3,800	-	-	-	3,800	ODR
MDL	-	0.002	0.002	0.002	0.002	0.02	0.2	-	-	-	0.2	-
					200	9 Sampling (S	tantec)					
09-TP51-BS2	1.6 - 2.0	<0.03	< 0.03	<0.03	<0.05	-	-	<3	<15	<15	<20	-
09-TP52-BS2	1.4 - 1.8	<0.03	< 0.03	<0.03	<0.05	-	-	<3	<15	<15	<20	-
09-TP53-BS2	1.8 - 2.3	<0.03	< 0.03	<0.03	<0.05	-	-	<3	<15	<15	<20	-
09-MW25-SS3	1.2 - 1.8	<0.03	< 0.03	<0.03	<0.05	-	-	<3	36	210	250	LO
RDL	-	0.03	0.03	0.03	0.05	-	-	3	15	15	20	-

### Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable groundwater and coarse grained soil, lube oil impacts (September, 2003)

2 = Modified TPH - Tier I does not include BTEX

MDL = Method Detection Limit; RDL = Reportable Detection Limit for routine analysis

< # = Not detected above MDL/RDL noted

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

ODR = Outside diesel range; LO = Lube oil fraction

### Table 11.2 Results of Laboratory Analysis of Metals in Soil - Oil Shed Site Phase III ESA, HHERA and RAP Former U.S Military Facility, Northwest Point, NL Stantec Consulting Ltd. Project No. 121410105

			2009 Sampling (Stantec)								
Parameters	Units	Criteria <sup>1</sup>	09-MW25-SS3	RDL	09-SS44	09-SS45	09-SS46	RDL			
	Samp	le Depth (m)	1.2 - 1.8	-	0.0 - 0.15	0.0 - 0.15	0.0 - 0.15	-			
Aluminum	mg/kg	-	5,500	10	3,500	3,700	4,000	10			
Antimony	mg/kg	20	<2	2	2	<2	<2	2			
Arsenic	mg/kg	12	<2	2	<2	<2	<2	2			
Barium	mg/kg	500	43	5	45	37	44	5			
Beryllium	mg/kg	4	<2	2	<2	<2	<2	2			
Bismuth	mg/kg	-	<2	2	<2	<2	<2	2			
Boron	mg/kg	-	<5	5	<5	<5	<5	5			
Cadmium	mg/kg	10	<0.3	0.3	<0.3	<0.3	<0.3	0.3			
Chromium	mg/kg	64	15	2	12	9	11	2			
Cobalt	mg/kg	50	4	1	3	2	3	1			
Copper	mg/kg	63	9	2	17	16	17	2			
Iron	mg/kg	-	8,200	50	6,200	6,100	6,500	50			
Lead	mg/kg	140	3.9	0.5	69	66	48	0.5			
Lithium	mg/kg	-	5	2	3	3	3	2			
Manganese	mg/kg	-	110	2	75	64	76	2			
Mercury	mg/kg	6.6	<0.1	0.1	<0.1	<0.1	<0.1	0.1			
Molybdenum	mg/kg	10	<2	2	<2	<2	<2	2			
Nickel	mg/kg	50	8	2	6	5	6	2			
Rubidium	mg/kg	-	8	2	6	5	7	2			
Selenium	mg/kg	1	<2	2	<1	<1	<1	1			
Silver	mg/kg	20	<0.5	0.5	<0.5	<0.5	<0.5	0.5			
Strontium	mg/kg	-	8	5	7	6	7	5			
Thallium	mg/kg	1	<0.1	0.1	<0.1	<0.1	<0.1	0.1			
Tin	mg/kg	-	<2	2	<2	<2	<2	2			
Uranium	mg/kg	23	0.3	0.1	0.3	0.2	0.2	0.1			
Vanadium	mg/kg	130	18	2	15	15	16	2			
Zinc	mg/kg	200	19	5	36	27	29	5			

Notes:

1 = CCME Canadian Soil Quality Guidelines for Protection of Environmental and Human Health at a Residential/Parkland site (2007)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = No applicable guideline

### Table 11.3 Results of Laboratory Analysis of PAHs in Soil - Oil Shed Site Phase III ESA, HHERA and RAP Former U.S Military Facility, Northwest Point, NL Stantec Consulting Ltd. Project No. 121410105

				1999 Samp	ling (AGRA)	2009 Sampling (Stantec)		
Parameters	Units	Criteria <sup>1,3</sup>	Criteria <sup>2,3</sup>	O-TP1	MDL	09-SS46	RDL	
		Sam	ple Depth (m)	0.5	-	0.0 - 0.15	-	
Non-carcinogenic PAHs								
1-Methylnaphthalene	mg/kg	-	-	-	-	< 0.005	0.005	
2-Methylnaphthalene	mg/kg	-	-	-	-	<0.005	0.005	
Acenaphthene	mg/kg	-	-	<0.002	0.002	<0.005	0.005	
Acenaphthylene	mg/kg	-	-	<0.001	0.001	<0.005	0.005	
Anthracene	mg/kg	2.5	-	<0.001	0.001	<0.005	0.005	
Fluoranthene	mg/kg	50	-	<0.001	0.001	0.027	0.03	
Fluorene	mg/kg	-	-	<0.001	0.001	<0.005	0.005	
Naphthalene	mg/kg	-	-	<0.002	0.002	<0.005	0.005	
Perylene	mg/kg	-	-	<0.005	0.005	<0.005	0.005	
Phenanthrene	mg/kg	-	-	<0.001	0.001	0.019	0.03	
Pyrene	mg/kg	-	-	<0.003	0.003	0.024	0.03	
Carcinogenic PAHs								
Benzo(a)anthracene	mg/kg	-	-	<0.001	0.001	0.014	0.005	
Benzo(a)pyrene	mg/kg	20	-	<0.003	0.003	0.015	0.005	
Benzo(b)fluoranthene	mg/kg	-	-	<0.004	0.004	0.017	0.005	
Benzo(g,h,i)perylene	mg/kg	-	-	<0.002	0.002	0.015	0.005	
Benzo(k)fluoranthene	mg/kg	-	-	<0.004	0.004	0.016	0.005	
Chrysene	mg/kg	-	-	<0.001	0.001	0.038	0.005	
Indeno(1,2,3-c,d) pyrene	mg/kg	-	-	<0.003	0.003	0.015	0.005	
Dibenz(a,h,)anthracene	mg/kg	-	-	<0.004	0.004	<0.005	0.005	
Benzo(	a)pyrene TPE <sup>4</sup>	-	5.3	0.004	-	0.024	-	

#### Notes:

1 = CCME Canadian Soil Quality Guidelines for the Protection of Environmental Health at a Residential/Parkland Site (2008)

2 = CCME Canadian Soil Quality Guidelines for Protection of Human Health for a Residential Site (Direct Soil Contact) (2008)

3 = As per CCME recommendations, soil samples are compared against the SQG for the protection of human health and environmental health separately

4 = Carcinogenic PAHs Assessed as Benzo(a)pyrene Total Potency Equivalent (TPE)

MDL = Method Detection Limit; RDL = Reportable Detection Limit for routine analysis

< # = Not detected above MDL/RDL noted

"-" = No applicable guideline or does not apply

Shaded = Value exceeds applicable criteria

# Table 11.4 Results of Laboratory Analysis of PCBs in Soil - Oil Shed SitePhase III ESA, HHERA and RAPFormer U.S Military Facility, Northwest Point, NLStantec Consulting Ltd. Project No. 121410105

Sample Location	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)
	Units	ug/g
	Criteria <sup>1</sup>	1.3
	1999 Sampling (AGRA)	
O-TP1	0.5	0.14
MDL	-	0.005
	2009 Sampling (Stantec)	
09-SS46	0.0 - 0.15	<0.05
RDL	-	0.05

Notes:

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

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

# Table 11.5Results of Laboratory Analysis of TPH/BTEX in Groundwater - Oil Shed SitePhase III ESA, HHERA and RAPFormer U.S Military Facility, Northwest Point, NLStantec Consulting Ltd. Project No. 121410105

Sample Location	Benzene	Toluene	Ethylbenzene	Xylenes	C <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>10</sub> -C <sub>21</sub> (Fuel Range)	21 02	Modified TPH - Tier I <sup>2</sup>	Resemblance
RDL	0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	-
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-
Tier I RBSLs <sup>1</sup>	1	20	20	20	-	-	-	12/20/20	-
			2	009 Sampling	(Stantec)				
09-MW25	<0.001	<0.001	<0.001	<0.002	<0.01	<0.05	<0.1	<0.1	-

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable

groundwater and coarse grained soil, fuel oil impacts (September, 2003)

2 = 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

# Table 11.6 Results of Laboratory Analysis of Dissolved Metals in Groundwater - Oil Shed SitePhase III ESA, HHERA and RAPFormer U.S Military Facility, Northwest Point, NLStantec Consulting Ltd. Project No. 121410105

				2009 Sampling (Stantec)
Parameters	RDL	Units	Criteria <sup>1</sup>	09-MW25
Aluminum	5.0	ug/L	-	75.6
Antimony	2.0	ug/L	20,000	<2.0
Arsenic	2.0	ug/L	1,900	<2.0
Barium	5.0	ug/L	29,000	11.5
Beryllium	2.0	ug/L	67	<2.0
Bismuth	2.0	ug/L	-	<2.0
Boron	5.0	ug/L	45,000	12.3
Cadmium	0.017	ug/L	2.7	<0.017
Chromium	1.0	ug/L	810	1.4
Cobalt	0.40	ug/L	66	<0.40
Copper	2.0	ug/L	87	2.4
Iron	50	ug/L	-	<50
Lead	0.50	ug/L	25	2.79
Manganese	2.0	ug/L	-	16.8
Mercury	0.02	ug/L	0.29	0.083
Molybdenum	2.0	ug/L	9,200	<2.0
Nickel	2.0	ug/L	490	<2.0
Selenium	1.0	ug/L	63	<1.0
Silver	0.10	ug/L	1.5	52.3
Strontium	5.0	ug/L	-	<0.10
Thallium	0.10	ug/L	510	<2.0
Tin	2.0	ug/L	-	<2.0
Titanium	2.0	ug/L	-	<0.10
Uranium	0.10	ug/L	420	<2.0
Vanadium	2.0	ug/L	250	<2.0
Zinc	5.0	ug/L	1,100	5.8

#### Notes:

1 = Ontario Ministry of the Environment (MOE) Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. July 27,

2009. Table 3: full depth generic site condition standards in a non-potable groundwater condition, coarse-grained soil

< # = Not detected above RDL noted

"-" = No applicable guideline

#### Table 11.7 Results of Laboratory Analysis of General Chemistry in Groundwater - Oil Shed Site Phase III ESA, HHERA and RAP Former U.S Military Facility, Northwest Point, NL Stanton Consulting Ltd. Broinst No. 121410105

Stantec Consulting Ltd. Project No. 121410105

				2009 Sampling (Stantec)
Parameter	RDL	Units	Criteria <sup>1</sup>	09-MW25
Metals				
Dissolved Calcium	0.1	mg/L	-	6.5
Dissolved Magnesium	0.1	mg/L	-	3.6
Dissolved Phosphorus	0.1	mg/L	<0.004 to >0.1 <sup>3</sup>	<0.1
Dissolved Potassium	0.1	mg/L	-	2.5
Dissolved Sodium	0.1	mg/L	-	3.5
Calculated Parameters				
Anion Sum	N/A	me/L	-	0.640
Bicarb. Alkalinity (calc. as CaCO3)	1	mg/L	-	28
Calculated TDS	1	mg/L	-	58
Carb.Alkalinity (calc. as CaCO3)	1	mg/L	-	<1
Cation Sum	N/A	me/L	-	0.840
Hardness (CaCO3)	1	mg/L	-	31
Ion Balance (% Difference)	N/A	%	-	13.5
Langelier Index (@ 20C)	-	N/A	-	-2.36
Langelier Index (@ 4C)	-	N/A	-	-2.61
Nitrate (N)	0.05	mg/L	2.9	0.52
Saturation pH (@20C)	-	N/A	-	9.06
Saturation pH (@4C)	-	N/A	-	9.31
Inorganics		•	•	
Total Alkalinity (Total as CaCO3)	5	mg/L	-	28
Dissolved Chloride (Cl)	1	mg/L	-	2
Colour	5	TCU	-	15
Nitrate + Nitrite	0.05	mg/L	-	0.53
Nitrite (N)	0.01	mg/L	0.06	0.01
Nitrogen (Ammonia Nitrogen)	0.05	mg/L	-	<0.05
Total Organic Compound	500	mg/L	-	<500(1)
Orthophosphate (P)	0.01	mg/L	-	0.01
рН	N/A	pН	6.5 - 9	6.70
Reactive Silica (Si)2)	0.5	mg/L	-	21
Dissolved Sulphate (SO4)	2	mg/L	-	<2
Turbidity	10	NTU	Narritive <sup>2</sup>	>1000
Conductivity	1	uS/cm	-	65

Notes:

1 = CCME Water Quality Guidelines for the protection of freshwater aquatic life (2007)

2 = Maximum increase of 8 NTUs from background levels when background levels are between 8 and 80 NTUs

3 = Phosphorous guideline is dependant on trophic status of the freswater environment

RDL = Reportable Detection Limit

< # = Not detected above RDL noted

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

(1) Detection limit increased due to sample matrix

Table 11.8 Results of Laboratory Analysis of PCBs in Vegetation - Oil Shed SitePhase III ESA, HHERA and RAPFormer U.S Military Facility, Northwest Point, NLStantec Consulting Ltd. Project No. 121410105

Sample Location	Polychlorinated Biphenyls (PCBs)				
RDL	0.3				
Units	ug/L				
Criteria	na				
2009 Sampling (Stantec)					
09-VEG-01	<0.3				
09-VEG-01 Lab-Dup	<0.3				

Notes:

RDL = Reportable Detection Limit na = No applicable guideline Lab-dup = Laboratory duplicate sample

< # = Not detected above RDL noted</pre>

## Appendix 11e

Results of Hydraulic Response (Bail-Down) Test

Stantec Consulting Ltd. 607 Torbay Road			Slug Test Data Report Project: Northwest Point			
St. John's, NL, A1A 4Y6			Number: 121410105			
Stantec Tel: (709) 576-1458			Client: NLDEC		Page 1	
Test Well:	09-MW25		Slug Test:	09-MW25		
			Test Well:	09-MW25		
Depth to Static WL	.: 1,43 [m]		Casing radius:	0.025 [m]		
Location:			Boring radius:	0.05 [m]		
Recorded by:	Stantec		Screen length:	3.05 [m]		
Date:	8/26/2009		Aquifer Thickness:	2.97 [m]		
	Time [s]	Dept	h to WL [m]		Drawdown [m]	
1	10		3.89		2.46	
2	20		3.76		2.33	
3	30		3.70		2.27	
4	40		3.66		2.23	
5	50		3.61		2.18	
6	60		3.59		2.16	
7	120		3.30		1.87	
8	180		3.16		1.73	
9	240		3.02		1.59	\$
10	300		2.90		1.47	
11	360		2.78		1.35	
12	420		2.66		1.23	
13	480		2.55		1.12	
14	600		2.43		1.00	
15	900		2.30		0.87	
16	1200		2.01		0.58	
17	1800		1.76		0.33	
18	2400		1.60		0.17	
19	3000		1.51		0.08	
20	3600		1.43		0.00	

