

Appendix 16a

Site Photos

– Pipeline

Site Photographs – Pipeline



Photo 1 View of pipeline near the Wharf Area (looking northeast)

Appendix 16b

Sample Coordinates

– Pipeline

Sample Coordinates - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Coordinates	
	Easting	Northing
MONITOR WELLS		
MW-53	0675427	6149098
MW-54	0675453	6149063
MW-55	0675443	6149097
MW-56	0675454	6149106
MW-57	0675389	6149167
MW-59	0675320	6149320
MW-60	0675382	6149310
MW-68	0675419	6149085
MW-69	0675419	6149112
SURFACE SOIL		
BS229	0675585	6148867
BS230	0675547	6148595
BS231	0675509	6148967
BS232	0675496	6148988
BS233	0675478	6149031
BS234	0675438	6149082
BS235	0675419	6149131
BS236	0675379	6149196

Appendix 16c

Monitor Well Records

– Pipeline



MONITOR WELL RECORD

BOREHOLE No. MW53
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-17-09 WATER LEVEL 2.14m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						0.76 m STICK UP CAST IRON WELL HEAD
0		Brown, coarse, SAND (SP); some cobbles, trace organics			SS	1	0	4	0	D	-	-	BACKFILL
1					RC	2	229	11	0	M	-	-	BENTONITE
1		Brown, coarse, SAND (SP)			RC	3	305	20	0	M	-	-	
2		Grey, coarse, SAND (SP); some cobbles		▼	RC	4	279	22	2	M	-	5 600	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3		CLAY (CL) -pink styrofoam at 2.44 to 3.05 m depth			RC	5	152	4	3	-	-	<20	END CAP
4		End of Borehole											
5													
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW54
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-26-09 WATER LEVEL 0.69m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						FLUSH MOUNTED WELL HEAD ENCLOSURE
0		Light brown, SAND with gravel (SP)			SS	1	178	5	0	M	-	-	<p>BACKFILL BENTONITE</p> <p>50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK</p> <p>END CAP</p>
1		Light brown, medium grained, SAND (SP)			SS	2	152	6	0	M	-	640	
1.5		Light brown, medium grained, SAND (SP); trace light green clay			SS	3	178	6	0		-	-	
2		Light grey, CLAY (CL)			SS	4	559	7	0		-	-	
3		End of Borehole											
4													
5													
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW55
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-26-09 WATER LEVEL 0.94m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						FLUSH MOUNTED WELL HEAD ENCLOSURE
		Brownish grey, medium grained, SAND (SP)			SS	1	203		0	-	-		<p>BACKFILL BENTONITE</p> <p>50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK</p> <p>END CAP</p>
1		Brownish grey, medium grained, SAND (SP); trace fine gravel		▼	SS	2	584		0	-	-		
		Brownish grey and reddish brown, medium grained, SAND (SP)			SS	3	406		0	-	56		
2		Light grey and pink, CLAY (CL)			SS	4	381		0	-	-		
3		End of Borehole											
4													
5													
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW56
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-26-09 WATER LEVEL 1.11m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						FLUSH MOUNTED WELL HEAD ENCLOSURE
0		Brown to grey, medium grained SAND with gravel (SP)			SS	1	279	24	0	D	-	-	<p>BACKFILL BENTONITE</p> <p>50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK</p> <p>END CAP</p>
1		Brown to grey, medium grained SAND with gravel (SP); trace cobbles			SS	2	102	12	0	M	-	-	
1.5		Grey and brown, CLAY with sand (CL)			SS	3	305	10	0	M	-	40	
2.0		Brownish grey, silty SAND (SM); some clay			SS	4	457	25/457	0	-	-	-	
3.0		End of Borehole											
4													
5													
6													
7													
8													
9													
10													


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MONITOR WELL RECORD

BOREHOLE No. MW57
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-26-09 WATER LEVEL 1.98m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Brown, coarse, SAND (SP); trace cobbles				mm							0.61 m STICK UP CAST IRON WELL HEAD BACKFILL BENTONITE 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK END CAP
				SS	1	152	16	0	-	-			
1		Brown, medium grained, SAND (SP); trace cobbles		SS	2	152	13	0	-	-			
		Light brown, CLAY with sand (CL)		SS	3	305	11	0	-	<20			
2		Light brown to pink, CLAY (CL)		SS	4	483	17	0	-	-			
		Light pinkish brown, CLAY (CL)	SS	5	610	19	0	-	-				
3													
4		End of Borehole											
5													
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW59
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-27-09 WATER LEVEL 3m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						0.61 m STICK UP FLUSH MOUNTED WELL HEAD ENCLOSURE
0		Light brown, coarse, SAND (SP); some cobbles, trace gravel Grey and black, BEDROCK			SS	1	25	1/25	0		-	<20	BACKFILL BENTONITE
1					RC	2	92%		0		-	-	
2					RC	3	100%		0		-	-	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3		Dark grey and black, BEDROCK			RC	4	100%		0		-	-	
4					RC	5	100%		0		-	-	END CAP
5		End of Borehole											
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW60
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-27-09 WATER LEVEL 2.33m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Light greyish brown, coarse SAND (SP); some cobbles				mm							FLUSH MOUNTED WELL HEAD ENCLOSURE
0		Light to dark grey, BEDROCK											BACKFILL
1													BENTONITE
2													50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
2.33					RC	2	67%		0		-	-	
3		Dark grey, trace white, BEDROCK											
3					RC	3	90%		0		-	-	
4													END CAP
5		End of Borehole											
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW68
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 10-2-09 WATER LEVEL 0.93m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0							mm						FLUSH MOUNTED WELL HEAD ENCLOSURE
0		Light brown, coarse SAND with gravel (SP); some cobbles Cobbles and boulders			SS	1	76	61/152	0	D	-	-	<p>BACKFILL BENTONITE</p> <p>50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK</p> <p>END CAP</p>
1		Light brown, coarse, SAND (SP); trace coarse gravel			SS	2	203	203	0	S	-	-	
2		Light brownish grey, coarse, SAND (SP); trace fine gravel Cobbles and boulders			SS	3	305	305	0	W	-	9	
2		White, trace pink and grey, BEDROCK			RC	4			0		-	700	
3					RC	5			0		-	-	
4		Dark grey, white and pink, BEDROCK			RC	6			0		-	-	
5		End of Borehole											
6													
7													
8													
9													
10													

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MONITOR WELL RECORD

BOREHOLE No. MW69
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 10-2-09 WATER LEVEL 1.76m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Brown, coarse, SAND (SP); some organics					mm						0.61 m STICK UP CAST IRON WELL HEAD BACKFILL BENTONITE 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK END CAP
1		Dark to light brown, coarse, SAND (SP); trace fine gravel			SS	1	203	6	0	D	-	-	
1					SS	2	178	6	0	D	-	-	
2					SS	3	279	12	0	M	-	-	
2					SS	4	330	17	0	S	-	5700	
3		Brown to dark brown, coarse SAND (SP) and light greyish brown, fine, silty SAND (SM)			SS	5	254	20	0	S	-	380	
4		End of Borehole											
5													
6													
7													
8													
9													
10													

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Appendix 16d

Soil Vapour Concentrations

– Pipeline

Sample Tipping Results - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (mbgs)	Hydrocarbon Odour	Soil Vapour Concentration (ppm)
SURFACE SOIL			
BS229	0.00-0.22	No	0.9
BS230	0.00-0.06	No	46.6
BS231	0.00-0.10	No	2.0
BS232	0.00-0.05	No	1.7
BS233	0.00-0.18	No	1.6
BS234	0.00-0.21	No	12.3
BS235	0.00-0.22	No	2.6
BS236	0.00-0.08	No	1.5

Appendix 16e

Laboratory Analytical Results Summary Tables

– Pipeline

**Table 16.1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Sample ID	Sample Depth (m)	Benzene	Toluene	Ethylbenzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₀ -C ₂₁ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH - Tier I ²	Resemblance
	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 ¹	0.16	14	58	17	-	-	-	140	FO/LO
MONITOR WELLS										
MW53-SS4	1.83 - 2.44	<0.03	<0.03	<0.03	<0.05	65	4,600	850	5,600	WFO, LO
MW53-SS5	3.05 - 3.65	<0.03	<0.03	<0.03	<0.05	<3	<15	<15	<20	-
MW54-SS2	0.61 - 1.22	<0.03	<0.03	<0.03	<0.05	25	580	36	640	FO
MW55-SS3	1.22 - 1.83	<0.03	<0.03	<0.03	<0.05	<3	24	33	56	WFO, DNR LO
MW56-SS3	1.22 - 1.83	<0.03	<0.03	<0.03	<0.05	<3	40	<15	40	WFO
MW57-SS3	1.22 - 1.83	<0.03	<0.03	<0.03	<0.05	<3	<15	<15	<20	-
MW59-SS1	0.00 - 0.30	<0.03	<0.03	<0.03	<0.05	<3	<15	20	<20	DNR
MW60-SS1	0.00 - 0.30	<0.03	<0.03	<0.03	<0.05	<3	<15	27	27	Possible LO
MW68-SS3	1.52 - 1.83	<0.03	0.1	0.08	0.35	150	7,600	1,900	9,700	FO, LO
MW69-SS4	1.83 - 2.44	<0.03	<0.03	<0.03	<0.05	96	5,600	24	5,700	FO
MW69-SS5	2.44 - 3.05	<0.03	<0.03	<0.03	<0.05	5	380	<15	380	FO
SURFACE SAMPLES										
BS229	0.00 - 0.22	<0.03	<0.03	<0.03	<0.05	7	19	80	110	LO
BS230 ³	0.00 - 0.06	<0.03	<0.03	<0.03	<0.05	130	50,000	2,300	52,000	FO
BS231 ⁴	0.00 - 0.10	<0.1	<0.1	<0.1	<0.3	<10	<15	89	89	DNR
BS232 ⁴	0.00 - 0.05	<0.1	<0.1	<0.1	<0.3	<10	250	390	640	OP F/L
BS234	0.00 - 0.21	<0.03	<0.03	<0.03	<0.05	<3	1,500	42	1,600	FO, Possible LO
BS236	0.00 - 0.08	<0.03	<0.03	<0.03	<0.05	<3	<15	52	52	Possible LO

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

FO = Fuel oil fraction; WFO = Weathered fuel oil; LO = Lube oil fraction; DNR LO= No resemblance to petroleum products in the lube oil range; DNR = No resemblance to lube oil

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and fuel oil impacts

**Table 16.2 Results of Laboratory Analysis of PCBs in Soil - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Sample ID	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)
	RDL	0.05
	Units	mg/kg
	Criteria ¹	1.3
MONITOR WELLS		
MW54-SS2	0.61 - 1.22	<0.05
MW55-SS3	1.22 - 1.83	<0.05
MW56-SS3	1.22 - 1.83	<0.05
MW57-SS3	1.22 - 1.83	<0.05
MW69-SS4	1.83 - 2.44	0.2
SURFACE SAMPLES		
BS229	0.22	13.0
BS230	0.06	24
BS231	0.10	7.9

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

Shaded = Value exceeds applicable criteria

**Table 16.3 Results of Laboratory Analysis of VOCs in Soil - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Criteria ¹	Criteria ²	MONITOR WELLS	
					MW59-SS1	MW69-SS4
1,1,1-Trichloroethane	30	µg/kg	-	-	<30	<30
1,1,2,2-Tetrachloroethane	30/ 500 ³	µg/kg	-	-	<30	<500 ³
1,1,2-Trichloroethane	30	µg/kg	-	-	<30	<30
1,1-Dichloroethane	30	µg/kg	-	-	<30	<30
1,1-Dichloroethylene	30	µg/kg	-	-	<30	<30
1,2-Dichlorobenzene	30	µg/kg	-	1,000	<30	<30
1,2-Dichloroethane	30	µg/kg	-	-	<30	<30
1,2-Dichloropropane	30	µg/kg	-	-	<30	<30
1,3-Dichlorobenzene	30	µg/kg	-	1,000	<30	<30
1,4-Dichlorobenzene	30	µg/kg	-	1,000	<30	<30
Benzene	30	µg/kg	30/11	-	<30	<30
Bromodichloromethane	30	µg/kg	-	-	<30	<30
Bromoform	30	µg/kg	-	-	<30	<30
Bromomethane	200	µg/kg	-	-	<200	<200
Carbon Tetrachloride	30	µg/kg	-	-	<30	<30
Chlorobenzene	30	µg/kg	-	2,000	<30	<30
Chloroform	30	µg/kg	-	-	<30	<30
Chloromethane	30	µg/kg	-	-	<30	<30
cis-1,2-Dichloroethylene	30	µg/kg	-	-	<30	<30
cis-1,3-Dichloropropene	30	µg/kg	-	-	<30	<30
Dibromochloromethane	30	µg/kg	-	-	<30	<30
Ethylbenzene	30	µg/kg	82	-	<30	<30
Ethylene Dibromide	30	µg/kg	-	-	<30	<30
Methylene Chloride(Dichloromethane)	30	µg/kg	-	-	<30	<30
o-Xylene	30	µg/kg	-	-	<30	<30
p+m-Xylene	30	µg/kg	-	-	<30	<30
Styrene	30	µg/kg	-	-	<30	<30
Tetrachloroethylene	30	µg/kg	200	-	<30	<30
Toluene	30	µg/kg	370	-	<30	<30
trans-1,2-Dichloroethylene	30	µg/kg	-	-	<30	<30
trans-1,3-Dichloropropene	30	µg/kg	-	-	<30	<30
Trichloroethylene	30	µg/kg	-	-	<30	<30
Trichlorofluoromethane (FREON 11)	30	µg/kg	10	-	<30	<30
Vinyl Chloride	30	µg/kg	-	-	<30	<30

Notes:

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

2 = CCME Interim remediation criteria for soil that have not been replaced by Canadian Soil Quality Guidelines (1991)

3 = Elevated RDL due to matrix interface

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

**Table 16.4 Results of Laboratory Analysis of Available Metals in Soil - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Criteria ¹	MONITOR WELLS	SURFACE SAMPLES
				MW53-SS3	BS230
Aluminum	10	mg/kg	-	7,000	7,100
Antimony	2	mg/kg	20	<2	<2
Arsenic	2	mg/kg	12	<2	<2
Barium	5	mg/kg	500	21	190
Beryllium	2	mg/kg	4	<2	<2
Bismuth	2	mg/kg	-	<2	<2
Boron	5	mg/kg	-	<5	5
Cadmium	0.3	mg/kg	10	<0.3	0.3
Chromium	2	mg/kg	64	20	110
Cobalt	1	mg/kg	50	4	6
Copper	2	mg/kg	63	10	70
Iron	50	mg/kg	-	8,500	9,700
Lead	0.5	mg/kg	140	3.4	65
Lithium	2	mg/kg	-	9	9
Manganese	2	mg/kg	-	97	160
Mercury	0.1	mg/kg	6.6	<0.1	0.1
Molybdenum	2	mg/kg	10	<2	<2
Nickel	2	mg/kg	50	12	47
Rubidium	2	mg/kg	-	7	14
Selenium	2	mg/kg	1	<2	<2
Silver	0.5	mg/kg	20	<0.5	<0.5
Strontium	5	mg/kg	-	11	26
Thallium	0.1	mg/kg	1	<0.1	0.2
Tin	2	mg/kg	50	<2	2
Uranium	0.1	mg/kg	23	0.6	0.9
Vanadium	2	mg/kg	130	17	18
Zinc	5	mg/kg	200	23	510

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

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

Shaded = Value exceeds applicable criteria

**Table 16.5 Results of Laboratory Analysis of TPH/BTEX in Groundwater - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₁ -C ₂₀ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH - Tier I ²	Resemblance
RDL	0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	-
RDL ³	0.001	0.001	0.001	0.002	0.01	0.06	0.1	0.1	-
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-
Criteria ¹	1	20	20	20	-	-	-	20	-
MONITOR WELLS									
MW53	0.002	0.006	0.064	0.27	3.8	310	51	370	WFO
MW54 ³	<0.001	0.002	<0.001	<0.002	<0.01	0.55	<0.1	0.5	WFO
MW55 ³	0.001	0.007	<0.001	0.005	<0.01	0.19	0.1	0.3	WFO, Possible LO
MW56 ³	0.001	0.009	0.002	0.008	0.03	0.35	<0.1	0.4	WFO
MW57	<0.001	0.005	0.001	0.005	<0.01	<0.17	<0.34	<0.1	-
MW58	<0.001	0.005	0.001	0.006	<0.01	<0.18	<0.35	<0.1	-
MW59	0.001	0.004	0.002	0.008	0.08	<0.05	<0.1	<0.1	-
MW60	0.002	0.005	0.001	0.005	0.05	<0.05	<0.1	<0.1	-
MW69	0.005	0.008	0.001	0.005	<0.01	0.2	<0.1	0.2	WFO

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

3 = Elevated RDL(s)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

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

WFO=Weathered fuel oil fraction; LO=Lube oil fraction

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and fuel oil impacts

**Table 16.6 Results of Laboratory Analysis of TPH fractionation in Groundwater - Pipeline Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Guidelines ¹	MONITOR WELLS
				MW68
Benzene	0.001	mg/L	1	<0.001
Toluene	0.001	mg/L	20	0.007
Ethylbenzene	0.001	mg/L	20	0.001
Xylenes	0.002	mg/L	20	0.005
Modified TPH - Tier II ²	0.1	mg/L	20	2
> C8-C10 Aromatic	0.01	mg/L	-	<0.01
> C10-C12 Aromatic	0.02	mg/L	-	0.05
> C12-C16 Aromatic	0.06	mg/L	-	0.19
> C16-C21 Aromatic	0.06	mg/L	-	0.14
> C21-C32 Aromatic	0.1	mg/L	-	0.2
> C6-C8 Aliphatic	0.01	mg/L	-	<0.01
> C8-C10 Aliphatic	0.01	mg/L	-	<0.01
> C10-C12 Aliphatic	0.01	mg/L	-	0.17
> C12-C16 Aliphatic	0.06	mg/L	-	0.66
> C16-C21 Aliphatic	0.06	mg/L	-	0.33
> C21-C32 Aliphatic	0.1	mg/L	-	0.3
Resemblance	-	-	-	FO, LO

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 II 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

FO=Fuel oil fraction; LO=Lube oil fraction

**Table 16.7 Results of Laboratory Analysis of PCBs in Surface Water - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Sample ID	Polychlorinated Biphenyls (PCBs)
RDL	0.2
Units	ug/L
Criteria ¹	0.2
MONITOR WELLS	
MW53	<0.2

Notes:

1 = OMOE Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, Non-Potable Groundwater (2004)

RDL = Reportable Detection Limit

na = No applicable guideline

< # = Not detected above RDL noted

**Table 16.8 Lab Analysis of Available Metals in Groundwater - Pipeline
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Criteria ¹	MONITOR WELLS
				MW59
Aluminum	5	ug/L	-	63.5
Antimony	2	ug/L	16,000	<2.0
Arsenic	2	ug/L	480	<2.0
Barium	5	ug/L	23,000	10.4
Beryllium	2	ug/L	53	<2.0
Bismuth	2	ug/L	-	<2.0
Boron	5	ug/L	50,000	28
Cadmium	0.017	ug/L	11	0.037
Chromium	1	ug/L	2,000	<1.0
Cobalt	0.4	ug/L	100	0.91
Copper	2	ug/L	23	6.2
Iron	50	ug/L	-	1160
Lead	0.5	ug/L	32	0.68
Manganese	2	ug/L	-	242
Molybdenum	2	ug/L	7,300	2.8
Nickel	2	ug/L	1,600	<2.0
Selenium	1	ug/L	50	<1.0
Silver	0.1	ug/L	1.2	<0.10
Strontium	5	ug/L	-	73.3
Thallium	0.1	ug/L	400	<0.10
Tin	2	ug/L	-	<2.0
Titanium	2	ug/L	-	2.7
Uranium	0.1	ug/L	-	2.94
Vanadium	2	ug/L	200	<2.0
Zinc	5	ug/L	1,100	51.3

Notes:

1 = OMOE Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, Non-Potable Groundwater (2004)

2 = Elevated RDLs

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