

## **Appendix 12a**

Sample Coordinates

– Pit No. 3

**Sample Coordinates - Pit No. 3**  
**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
<b>TEST PITS</b>		
TP-161	0676005	6149441
TP-162	0675103	6149747
TP-163	0675137	6149731
TP-164	0675099	6149737
TP-165	0675118	6149725
TP-166	0675099	6149715
TP-167	0675119	6149707
TP-168	0675122	6149688
TP-169	0675097	6149697
TP-170	0675088	6149677
TP-171	0675105	6149657
TP-172	0675083	6149636
TP-173	0675088	6149627
TP-174	0675086	6149614
TP-175	0675088	6149597
TP-176	0675113	6149581
<b>SURFACE SOIL</b>		
BS237	0675135	6149678
BS238	0675128	6149696
BS239	0675120	6149705
BS240	0675105	6149717
BS241	0675150	6149736
BS267	0675143	6149675
BS268	0675137	6149687
BS269	0675155	6149739
BS270	0675152	6149728
BS271	0675152	6149721
<b>MONITOR WELLS</b>		
MW-25	0675100	6149766
MW-26	0675114	6149736
MW-27	0675105	6149726
MW-28	0675136	6149734
MW-29	0675116	6149717
MW-30	0675120	6149695

## **Appendix 12b**

Test Pit and Monitor Well Records

– Pit No. 3







































# MONITOR WELL RECORD

BOREHOLE No. MW25  
 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 9-8-09 WATER LEVEL 0.58m 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, SAND (SP); some cobbles				mm							0.76 m STICK UP CAST IRON WELL HEAD BENTONITE 50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK END CAP
		Brownish grey, SAND (SP)			SS	1	229	8	2	49.7	-		
		Grey, silty SAND (SM)			SS	2	152	56/152	2	135.0	-		
1					AU	3	-		2	223.0	-		
2		End of Borehole											
3													
4													
5													
6													
7													
8													
9													
10													

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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 9-8-09 WATER LEVEL 0.37m 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, SAND (SP); some dark brown organics		▼			mm						0.61 m STICK UP CAST IRON WELL HEAD BENTONITE  50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK  END CAP
1		Brown and grey, SAND (SP)			SS	1	254	2	0	D	27.8	-	
2		Brownish grey, SAND (SP)			SS	2	279	8	2	S	106.0	-	
3		Brownish grey, SAND (SP)			SS	3	457	15	0	M	7.3	-	
4		End of Borehole			SS	4	305	18	0	M	5.4	<20	
5													
6													
7													
8													
9													
10													

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# MONITOR WELL RECORD

BOREHOLE No. MW27  
 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 9-8-09 WATER LEVEL 0.45m 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		Dark brown, SAND (SP); some organics		▼			mm						0.61 m STICK UP CAST IRON WELL HEAD
		Brown and grey, SAND (SP)			SS	1	152	2	2		95.5	9	BENTONITE
1		Grey, silty SAND (SM)			SS	2	203	2	2		138.0	-	
		Grey, silty SAND (SM)			SS	3	279	6	2	S	74.1	880	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
2		Grey, SAND (SP); some cobbles			SS	4	305	12	0		15.8	-	
3		End of Borehole											END CAP
4													
5													
6													
7													
8													
9													
10													

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# MONITOR WELL RECORD

BOREHOLE No. MW28  
 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 9-9-09 WATER LEVEL 2.56m 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		Dark brown, SAND (SP); some organics				mm							0.76 m STICK UP CAST IRON WELL HEAD
		Pink and grey, BEDROCK		SS	1	51	35/102	1		27.0	2	900	BACKFILL
1				SS	2	100%		0		-	-	-	BENTONITE
2				SS	3	95%		0		-	-	-	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3			SS	4	100%		0		-	-	-	END CAP	
4		End of Borehole											
5													
6													
7													
8													
9													
10													

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# MONITOR WELL RECORD

BOREHOLE No. MW29  
 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 9-9-09 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						0.69 m STICK UP
0		Brown, SAND (SP); some organics		▼	SS	1	76	2	1		57.5	-	CAST IRON WELL HEAD
1		Brown, SAND (SP); some cobbles and organics			SS	2	254	6	0		128.0	9 000	BACKFILL
2		Pink and grey, BEDROCK			SS	3	0	30/76	0		-	-	BENTONITE
3					RC	4	97%		0		-	-	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
4		End of Borehole			RC	5	100%		0		-	-	END CAP
5													
6													
7													
8													
9													
10													

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# MONITOR WELL RECORD

BOREHOLE No. MW30  
 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 9-9-09 WATER LEVEL 1.19m 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 CAST IRON WELL HEAD
0		Brown, SAND (SP); some cobbles and organics			SS	1	305	4	2		136.0	-	BACKFILL
1					SS	2	254	29	2		176.0	7 000	BENTONITE
1		Pink and light to dark grey, BEDROCK			SS	3	100%		0		-	-	
2					RC	4	100%		0		-	-	50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3					RC	5	100%		0		-	-	
4		End of Borehole											END CAP
5													
6													
7													
8													
9													
10													

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## **Appendix 12c**

Soil Vapour Concentrations

– Pit No. 3

**Sample Tipping Results - Pit No. 3**  
**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)
<b>TEST PITS</b>			
TP161-BS1	0.2-0.3	Yes	381
TP161-BS2	1.7-1.8	Yes	740
TP162-BS1	0.2-0.3	Yes	0.0
TP162-BS2	1.6-1.7	Yes	660
TP163-BS1	0.4-0.5	Yes	0.0
TP164-BS1	0.2-0.3	Yes	104
TP164-BS2	1.6-1.7	Yes	0.0
TP165-BS1	0.2-0.3	Yes	29.4
TP165-BS2	0.7-0.8	Yes	146
TP166-BS1	0.5-0.6	Yes	135
TP167-BS1	0.4-0.5	Yes	3.5
TP168-BS1	0.8-0.9	Yes	0.0
TP169-BS1	0.2-0.3	Yes	324
TP169-BS2	1.4-1.5	Yes	618
TP170-BS1	0.2-0.3	Yes	0.0
TP170-BS2	1.5-1.6	Yes	0.0
TP171-BS1	0.0-0.1	No	0.0
TP172-BS1	0.0-0.3	No	0.0
TP173-BS1	0.0-0.2	No	0.0
TP174-BS1	0.6-0.7	No	0.0
TP175-BS1	0.0-0.2	No	0.0
TP175-BS2	0.4-0.6	No	0.0
TP176-BS1	0.6-0.7	No	0.0
<b>SURFACE SOIL</b>			
BS237	0.00-0.20	Fuel odor	12.4
BS238	0.00-0.17	Fuel odor	49.8
BS239	0.00-0.20	Chemical odor	69.3
BS240	0.00-0.25	No	84.7
BS241	0.00-0.15	Fuel odor	28.6
BS267	-	-	-
BS268	-	-	-
BS269	-	-	-
BS270	-	-	-
BS271	-	-	-

**Notes:**

"-" = Value not recorded

## **Appendix 12d**

Laboratory Analytical Results Summary Tables

– Pit No. 3

Table 12.1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pit 3  
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 <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
	RDL	0.03	0.03	0.03	0.05	3	15	15	20	-
	RDL <sup>3</sup>	0.3	0.3	0.3	0.5	30	150	15	200	-
	RDL <sup>4</sup>	0.03	0.03	0.03	0.09	3	75	15	80	-
	RDL <sup>5</sup>	0.03	0.03	0.03	0.05	3	75	15	80	-
	RDL <sup>6</sup>	0.03	0.03	0.03	0.05	3	750	75	800	-
	RDL <sup>7</sup>	0.03	0.03	0.03	0.06	3	15	15	20	-
	RDL <sup>8</sup>	0.03	0.03	0.07	0.09	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>	0.16	14	58	17	-	-	-	140	-
<b>TEST PITS</b>										
TP161-BS1 <sup>3</sup>	0.2 - 0.3	<0.3	<0.3	<0.3	<0.5	1,200	37,000	81	39,000	FO
TP162-BS2	1.6 - 1.7	<0.03	<0.03	<0.03	<0.05	190	2,600	36	2,800	FO
TP164-BS1 <sup>4</sup>	0.2 - 0.3	<0.03	<0.03	<0.03	<0.09	180	19,000	180	19,000	FO
TP165-BS2	0.7 - 0.8	<0.03	<0.03	<0.03	<0.05	81	5,200	210	5,500	FO
TP166-BS1 <sup>5</sup>	0.5 - 0.6	<0.03	0.07	<0.03	0.08	190	10,000	48	10,000	FO
TP167-BS1	0.4 - 0.5	<0.03	<0.03	<0.03	<0.05	10	760	39	800	WFO
TP169-BS1 <sup>6</sup>	0.2 - 0.3	<0.03	0.48	<0.03	12	470	76,000	950	77,000	FO, (1)
TP169-BS2	1.4 - 1.5	<0.03	<0.03	<0.03	0.36	66	280	<15	350	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	1,100	OP F/L, Possible LO, (2)
TP172-BS1	0.0 - 0.3	<0.03	0.20	<0.03	0.16	<3	120	570	700	OP F/L, LO, (2)
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	650	LO
TP176-BS1-Lab-Dup	0.6 - 0.7	<0.03	<0.03	<0.03	<0.05	<3	-	-	-	-
<b>SURFACE SAMPLES</b>										
BS237 <sup>5</sup>	0.00 - 0.20	<0.03	<0.03	<0.03	<0.05	<3	24,000	740	24,000	WFO
BS238	0.00 - 0.17	<0.03	<0.03	<0.03	<0.05	45	910	45	1,000	WFO
BS239	0.00 - 0.20	<0.03	<0.03	<0.03	<0.05	69	6,900	130	7,100	FO
BS240	0.00 - 0.25	<0.03	<0.03	<0.03	0.09	110	4,600	85	4,800	FO
BS241	0.00 - 0.15	<0.03	<0.03	<0.03	<0.05	<3	4,300	140	4,400	FO
BS267	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	370	140	510	WFO
BS268	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	720	190	920	OP F, NRL
BS269	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	35	130	170	DNR
BS270 <sup>8</sup>	Not recorded	<0.03	<0.03	<0.07	<0.09	<3	190	200	400	OP F/L, (2)
BS271	Not recorded	<0.03	<0.03	<0.03	<0.05	<3	5,000	230	5,200	WFO

Table 12.1 Results of Laboratory Analysis of TPH/BTEX in Soil - Pit 3  
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 <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
RDL		0.03	0.03	0.03	0.05	3	15	15	20	-
RDL <sup>3</sup>		0.3	0.3	0.3	0.5	30	150	15	200	-
RDL <sup>4</sup>		0.03	0.03	0.03	0.09	3	75	15	80	-
RDL <sup>5</sup>		0.03	0.03	0.03	0.05	3	75	15	80	-
RDL <sup>6</sup>		0.03	0.03	0.03	0.05	3	750	75	800	-
RDL <sup>7</sup>		0.03	0.03	0.03	0.06	3	15	15	20	-
RDL <sup>8</sup>		0.03	0.03	0.07	0.09	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>		0.16	14	58	17	-	-	-	140	-
<b>MONITOR WELLS</b>										
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	9,100	FO
MW27-SS3	1.22 - 1.83	<0.03	<0.03	<0.03	<0.05	50	790	42	880	FO
MW28-SS1	0.00 - 0.10	<0.03	<0.03	<0.03	<0.05	9	2,400	500	2,900	WFO, Possible LO
MW29-SS2	0.61 - 1.22	<0.03	0.09	<0.03	0.16	130	8,700	190	9,000	FO
MW30-SS2	0.61 - 1.22	<0.03	0.05	<0.03	0.46	230	6,700	87	7,000	WFO
MW30-SS2 Lab-Dup	0.61 - 1.22	<0.03	0.04	<0.03	0.46	200	-	-	-	-

**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

3,4,5,6,7 = Elevated RDL(s) due to sample dilution

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

FO = Fuel oil fraction; WFO = Weathered fuel oil; LO = Lube oil fraction; DNR = No resemblance to petroleum products; OP F/L= One product in fuel/lube oil range;

NRL = No resemblance to products in the lube oil range; (1) - Unidentified compound(s) in lube oil range; (2) - Unidentified compound(s) in fuel/lube oil range.

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

**Table 12.2 Results of Laboratory Analysis of TPH fractionation in Soil - Pit 3**  
**Phase II/III ESA, HHERA and RAP/RMP**  
**Former US Military Site and Residential Subdivision, Hopedale, NL**  
**Project No. 121410103**

Parameters	RDL (Test Pits)	RDL (Monitor Wells)	Units	Tier I RBSLs <sup>1</sup>	TEST PITS	MONITOR WELLS
					TP161-BS2	MW25-SS2
Benzene	0.03	0.03	mg/L	0.16	<0.03	<0.03
Toluene	0.03	0.03	mg/L	14	<0.03	<0.03
Ethylbenzene	0.03	0.03	mg/L	58	<0.03	<0.03
Xylenes	0.05	0.05	mg/L	17	<0.05	0.07
Modified TPH - Tier II <sup>2</sup>	20	20	mg/L	140	1,600	10,000
> C8-C10 Aromatic	0.1	0.1	mg/L	-	<0.1	<0.1
> C10-C12 Aromatic	14	4	mg/L	-	67	220
> C12-C16 Aromatic	15	15	mg/L	-	190	1,100
> C16-C21 Aromatic	15	15	mg/L	-	57	430
> C21-C32 Aromatic	15	15	mg/L	-	<15	64
> C6-C8 Aliphatic	0.2	0.1	mg/L	-	6	11
> C8-C10 Aliphatic	0.4	0.9	mg/L	-	170	290
> C10-C12 Aliphatic	8	8	mg/L	-	290	1,900
> C12-C16 Aliphatic	15	15	mg/L	-	660	4,800
> C16-C21 Aliphatic	15	15	mg/L	-	130	1,000
> C21-C32 Aliphatic	15	15	mg/L	-	<15	84
Resemblance	-	-	-	-	FO	FO

**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

OP G/F= One product in gas/fuel oil range.

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

**Table 12.3 Results of Laboratory Analysis of PCBs in Soil - Pit 3**  
**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 <sup>1</sup>	1.3
<b>TEST PITS</b>		
TP162-BS1	0.2 - 0.3	<0.05
TP163-BS1	0.4 - 0.5	<0.05
TP165-BS1	0.2 - 0.3	<0.05
TP167-BS1	0.4 - 0.5	<0.05
TP169-BS1	0.2 - 0.3	<0.05
TP172-BS1	0.0 - 0.3	0.32
TP176-BS1	0.6 - 0.7	0.08
<b>SURFACE SAMPLES</b>		
BS238	0.00 - 0.17	<0.05
BS239	0.00 - 0.20	<0.05
BS240	0.00 - 0.25	<0.05
BS241	0.00 - 0.15	<0.05
<b>MONITOR WELLS</b>		
MW27-SS1	0.00 - 0.61	<0.05
MW29-SS2	0.61 - 1.22	<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

Shaded = Value exceeds applicable criteria



**Table 12.4 Results of Laboratory Analysis of PAHs in Soil - Pit 3**  
**Phase II/III ESA, HHERA and RAP/RMP**  
**Former US Military Site and Residential Subdivision, Hopedale, NL**  
**Project No. 121410103**

Parameters	RDL (TP161-BS1)	RDL (TP161-BS2)	Units	Criteria <sup>1,3</sup>	Criteria <sup>2,3</sup>	TEST PITS	
						TP161-BS1	TP161-BS2
<b>Non-carcinogenic PAHs</b>							
1-Methylnaphthalene	0.01	0.01	mg/kg	-	-	3.7	0.13
2-Methylnaphthalene	0.01	0.01	mg/kg	-	-	5.5	0.14
Acenaphthene	0.9 <sup>5</sup>	0.04 <sup>5</sup>	mg/kg	-	-	<0.9	<0.04
Acenaphthylene	0.1 <sup>5</sup>	0.05 <sup>5</sup>	mg/kg	-	-	0.1	<0.05
Anthracene	0.01	0.01	mg/kg	2.5	-	<0.01	<0.01
Fluoranthene	0.01	0.01	mg/kg	50	-	<0.01	<0.01
Fluorene	0.01	0.01	mg/kg	-	-	0.48	0.06
Naphthalene	0.01	0.01	mg/kg	-	-	1.2	<0.01
Perylene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Phenanthrene	0.01	0.01	mg/kg	-	-	<0.01	0.05
Pyrene	0.01	0.01	mg/kg	-	-	0.02	<0.01
<b>Carcinogenic PAHs</b>							
Benzo(a)anthracene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Benzo(a)pyrene	0.01	0.01	mg/kg	20	-	<0.01	<0.01
Benzo(b)fluoranthene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Benzo(k)fluoranthene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Benzo(g,h,i)perylene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Chrysene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Dibenz(a,h,)anthracene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Indeno(1,2,3-c,d) pyrene	0.01	0.01	mg/kg	-	-	<0.01	<0.01
Benzo (a)pyrene TPE <sup>4</sup>				-	5.3	0.012	0.012

**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)

5 - Elevated RDL(s) due to matrix interface

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

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

Table 12.5 Results of Laboratory Analysis of Available Metals in Soil - Pit 3  
Phase II/III ESA, HHERA and RAP/RMP  
Former US Military Site and Residential Subdivision, Hopedale, NL  
Project No. 121410103

Parameters	RDL	Units	Criteria <sup>1</sup>	TEST PITS						SURFACE SAMPLES				MONITOR WELLS	
				TP163-BS1	TP169-BS1	TP169-BS2	TP169-BS2 Lab-Dup	TP171-BS1	TP174-BS1	BS238	BS239	BS240	BS241	MW29-SS2	MW30-SS2
Aluminum	10	mg/kg	-	7,100	6,000	5,300	5,400	3,100	7,200	5,500	5,300	7,900	340	3,200	3,900
Antimony	2	mg/kg	20	<2	<2	<2	<2	14	2	<2	<2	<2	<2	<2	<2
Arsenic	2	mg/kg	12	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Barium	5	mg/kg	500	15	7	7	8	68	120	9	8	15	<5	6	6
Beryllium	2	mg/kg	4	<2	<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	<2
Boron	5	mg/kg	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	0.3	mg/kg	10	<0.3	<0.3	<0.3	<0.3	<0.3	1.0	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	2	mg/kg	64	17	11	13	12	9	19	11	11	14	2	10	9
Cobalt	1	mg/kg	50	2	2	2	2	2	6	3	3	4	<1	1	2
Copper	2	mg/kg	63	4	10	10	10	11	44	8	7	12	<2	4	4
Iron	50	mg/kg	-	5,000	2,800	3,000	3,000	5,100	16,000	5,900	4,600	7,500	400	3,000	3,200
Lead	0.5	mg/kg	140	2	1.5	1.2	1.2	20	130	2.2	1.7	4.7	0.9	1.6	1.9
Lithium	2	mg/kg	-	5	3	3	3	<2	9	3	3	5	<2	2	3
Manganese	2	mg/kg	-	62	37	38	38	32	160	73	52	75	5	27	40
Mercury	0.1	mg/kg	6.6	<0.1	<0.1	<0.1	<0.1	0.2	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	2	mg/kg	10	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Nickel	2	mg/kg	50	7	6	6	7	4	17	7	7	11	<2	4	5
Rubidium	2	mg/kg	-	3	<2	<2	<2	3	16	<2	<2	3	<2	<2	<2
Selenium	2	mg/kg	1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Silver	0.5	mg/kg	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	5	mg/kg	-	15	12	10	11	13	11	10	10	11	<5	6	9
Thallium	0.1	mg/kg	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Tin	2	mg/kg	50	<2	<2	<2	<2	3	30	<2	<2	<2	<2	<2	<2
Uranium	0.1	mg/kg	23	0.8	2.4	0.6	0.6	0.3	0.4	0.8	0.7	1.5	<0.1	0.5	0.7
Vanadium	2	mg/kg	130	15	10	15	14	8	24	14	12	20	2	11	7
Zinc	5	mg/kg	200	15	9	9	9	34	420	12	11	15	<5	7	11

**Notes:**

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

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

Shaded = Value exceeds applicable criteria

**Table 12.6 Results of Laboratory Analysis of TPH/BTEX in Groundwater - Pit 3**  
**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 <sub>6</sub> -C <sub>10</sub> (Gas Range)	C <sub>11</sub> -C <sub>20</sub> (Fuel Range)	C <sub>21</sub> -C <sub>32</sub> (Lube Range)	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	-	-	-	20	-
MONITOR WELLS									
MW25	<0.001	0.006	<0.001	0.005	0.03	8.5	0.3	8.9	FO
MW27	<0.001	0.006	0.001	0.007	0.07	2.6	0.4	3	WFO, Possible LO
MW28	<0.001	0.006	<0.001	0.003	0.01	0.4	<0.1	0.4	WFO
MW29	<0.001	0.006	0.001	0.007	0.2	3.2	0.1	3.5	WFO
MW30	<0.001	0.008	0.005	0.039	0.19	1.8	<0.1	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

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 fraction; LO=Lube oil fraction

**Table 12.7 Results of Laboratory Analysis of TPH fractionation in Groundwater - Pit 3  
Phase II/III ESA, HHERA and RAP/RMP  
Former US Military Site and Residential Subdivision, Hopedale, NL  
Project No. 121410103**

Parameters	RDL	Units	Tier I RBLS <sup>1</sup>	MONITOR WELLS
				MW26
Benzene	0.001	mg/L	1	<0.001
Toluene	0.001	mg/L	20	0.005
Ethylbenzene	0.001	mg/L	20	0.001
Xylenes	0.002	mg/L	20	0.006
Modified TPH - Tier II <sup>2</sup>	0.1	mg/L	20	20
> C8-C10 Aromatic	0.01	mg/L	-	0.02
> C10-C12 Aromatic	0.01	mg/L	-	0.78
> C12-C16 Aromatic	0.05	mg/L	-	2.8
> C16-C21 Aromatic	0.05	mg/L	-	1
> C21-C32 Aromatic	0.1	mg/L	-	0.1
> C6-C8 Aliphatic	0.01	mg/L	-	0.02
> C8-C10 Aliphatic	0.01	mg/L	-	0.06
> C10-C12 Aliphatic	0.01	mg/L	-	3.3
> C12-C16 Aliphatic	0.05	mg/L	-	9.5
> C16-C21 Aliphatic	0.05	mg/L	-	2.2
> C21-C32 Aliphatic	0.1	mg/L	-	0.2
Resemblance	-	-	-	FO, 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 (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

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

**Table 12.8 Results of Laboratory Analysis of PCBs in Groundwater - Pit 3**  
**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	0.05
Units	ug/L
Criteria <sup>1</sup>	0.2
<b>MONITOR WELLS</b>	
MW30	<0.05

**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 12.9 Results of Laboratory Analysis of PAHs in Groundwater - Pit 3**  
**Phase II/III ESA, HHERA and RAP/RMP**  
**Former US Military Site and Residential Subdivision, Hopedale, NL**  
**Project No. 121410103**

Parameter	RDL	Units	Criteria <sup>1</sup>	MONITOR WELLS
				MW25
1-Methylnaphthalene	0.05	ug/L	13,000	0.07
2-Methylnaphthalene	0.05	ug/L	13,000	<0.05
Acenaphthene	0.01	ug/L	1,700	0.12
Acenaphthylene	0.04	ug/L	2,000	<0.04
Acridine	0.05	ug/L	-	0.34
Anthracene	0.01	ug/L	12	0.03
Benz[a]anthracene	0.01	ug/L	5.0	0.05
Benzo[a]pyrene	0.01	ug/L	1.9	<0.01
Benzo[b]fluoranthene	0.01	ug/L	7.0	0.03
Benzo[ghi]perylene	0.01	ug/L	0.2	<0.01
Benzo[k]fluoranthene	0.01	ug/L	0.4	0.02
Chrysene	0.01	ug/L	3.0	0.07
Dibenzo[a,h]anthracene	0.01	ug/L	0.25	<0.01
Fluoranthene	0.01	ug/L	130	0.03
Fluorene	0.01	ug/L	290	0.42
Indeno[1,2,3-cd]pyrene	0.01	ug/L	0.27	<0.01
Naphthalene	0.2	ug/L	5,900	<0.2
Perylene	0.01	ug/L	-	<0.01
Phenanthrene	0.01	ug/L	63	0.13
Pyrene	0.01	ug/L	40	0.09
Quinoline	0.05	ug/L	-	<0.05

**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 for routine analysis

Lab-dup = Laboratory duplicate sample

< # = Not detected above RDL noted

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

**Table 12.10 Results of Laboratory Analysis of Available Metals in Groundwater - Pit 3**  
**Phase II/III ESA, HHERA and RAP/RMP**  
**Former US Military Site and Residential Subdivision, Hopedale, NL**  
**Project No. 121410103**

Parameters	RDL	Units	Criteria <sup>1</sup>	MONITOR WELLS		
				MW26	MW28	MW30
Aluminum	5	ug/L	-	197	157	242
Antimony	2	ug/L	16,000	<2.0	<2.0	<2.0
Arsenic	2	ug/L	480	<2.0	<2.0	<2.0
Barium	5	ug/L	23,000	8.1	7.6	5.9
Beryllium	2	ug/L	53	<2.0	<2.0	<2.0
Bismuth	2	ug/L	-	<2.0	<2.0	<2.0
Boron	5	ug/L	50,000	5.3	5.3	<5.0
Cadmium	0.017	ug/L	11	0.022	<0.017	<0.017
Chromium	1	ug/L	2,000	<1.0	<1.0	<1.0
Cobalt	0.4	ug/L	100	2.76	1.32	4.12
Copper	2	ug/L	23	<2.0	5.3	<2.0
Iron	50	ug/L	-	7,000	1,970	5,860
Lead	0.5	ug/L	32	<0.50	<0.50	<0.50
Manganese	2	ug/L	-	120	234	186
Molybdenum	2	ug/L	7,300	<2.0	<2.0	<2.0
Nickel	2	ug/L	1,600	<2.0	2.4	<2.0
Selenium	1	ug/L	50	<1.0	<1.0	<1.0
Silver	0.1	ug/L	1.2	<0.10	<0.10	<0.10
Strontium	5	ug/L	-	43	19.3	185
Thallium	0.1	ug/L	400	<0.10	<0.10	<0.10
Tin	2	ug/L	-	<2.0	<2.0	<2.0
Titanium	2	ug/L	-	2.7	4.7	<2.0
Uranium	0.1	ug/L	-	0.28	0.31	1.63
Vanadium	2	ug/L	200	<2.0	3.6	<2.0
Zinc	5	ug/L	1,100	11.6	6.5	9.7

**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

Shaded = Value exceeds applicable criteria