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July 20, 2021

Edouard Hamel
Environmental Services, Imperial
P.O. Box 2480, Station M
Central Building C4A.086
Calgary, AB, T2P 3M9

Dear Mr. Hamel;

Project No: 60438249

**Regarding: Milestone 014: Field Activity Report - Well Decommissioning - Nova Scotia
(PID 70018528)**

1. Introduction

AECOM Canada Limited (AECOM) was retained by Imperial Oil Limited (Imperial) to bring the property at 181 Henry Hensey, Liverpool, Nova Scotia (Property Identifier Number – PID 70018528) to closure under full property remediation conditions within the Province of Nova Scotia Environment (NSE) Contaminated Sites Regulations (July, 2013).

This report is intended to provide the final supplementary information associated with the Declaration of Property Condition, 181 Henry Hensey Drive, Liverpool, Nova Scotia (AECOM, 2021).

2. Groundwater Monitoring Well Decommissioning Summary

The groundwater monitoring well decommissioning activities were conducted by AECOM on July 9, 2021 Groundwater monitoring well decommissioning activities were conducted in accordance to the NSE Contaminated Sites Regulations Protocol 700, Section 4.2 and with the Nova Scotia Environment and Labour Environmental Monitoring Well Decommissioning Fact Sheet (January, 2007).

Wells decommissioned within this program were:

- 51 millimeters (mm) in diameter or less;
- Less than 30 meters (m) deep; and
- Not considered to be multilevel wells.

Test pit monitoring wells TH1 (TP18), TH2 (TP28), TH3 (TP32), TH4 (TP45), TH5 (TP46), TH6 (TP48), TH7 (TP49) were previously destroyed or decommissioned by other consultants. Groundwater monitoring wells 15MW5, 15MW12, 15MW16, MW16-02, MW16-03, MW16-04, MW19-01 (off-site well) were destroyed during the remedial excavation that took place at the site (AECOM 2019). Monitoring well 15MW1 has never been located or sampled by AECOM and therefore is assumed to be destroyed or decommissioned by other consultants.

Remaining groundwater monitoring wells (15MW2, 15MW3, 15MW6, 15MW7, 15MW8, 15MW9, MW16-01, MW17-01, MW19-02) decommissioned by the following method:

- Collecting static water levels meters below top of casing (mbtoc) and total well depth mbtoc;
- Removing the flush mount well cover and J-plug;
- Pulling the well casing out;
- Cutting the PVC casing to a minimum of 0.3 meters below ground surface (mbgs);
- Filling the remaining PVC casing and screen with 3/8" bentonite chips to a depth of 0.2 mbgs;
- Hydrating the bentonite fill material by adding water to the borehole annulus; and
- Filling the remaining borehole annulus and flush mount hole with washed silica sand.

For all methods presented above, a steel rod was used to force bentonite pellets to the bottom of the wells as the pellets were slowly poured into the remaining monitoring well casings. This was done to reduce the possibility of bentonite bridging within the PVC casing and screen; and/or annulus area.

The attached **Table 1** summarizes the decommissioning activities and field parameters. **Figure 1** (attached) indicates the location of the groundwater monitoring wells that were decommissioned as part of this program. **Monitoring Well Logs** are attached to indicate the construction details of the wells that were decommissioned. The applicable **OIMS work permit** is attached to meet the milestone deliverable requirements.

An attached **photolog** provides photographs of the decommissioned well locations.

AECOM Canada Ltd. is pleased to submit the Well Decommissioning Summary for the above noted site. Should you have any questions, or require additional information, please contact me.

Sincerely,

AECOM Canada Ltd.

Report Prepared By:



Janice Shea, P.Eng.
Environmental Engineer

Report Reviewed By:



John Fairclough, P.Geo.
Site Professional

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The investigation undertaken by AECOM with respect to this report and any conclusions or recommendations made in this report reflect AECOM's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

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Monitoring Well ID	Decommission Date	Total Well Depth (mbtoc) (7/9/2021)	Static Water Level (mbtoc) (7/9/2021)	Depth of Casing Removed (mbgs)	Depth to Top of Screen (mbgs)	Bentonite Backfill Interval (mbgs)	Silica Sand Backfill Interval (mbgs)
TH1*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH2*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH3*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH4*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH5*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH6*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TH7*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15MW1***	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15MW2	7/9/2021	5.44	1.98	0.3	0.6	0.2-5.44	0.0-0.2
15MW3	7/9/2021	5.49	2.41	0.3	0.6	0.2-5.49	0.0-0.2
15MW5**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15MW6	7/9/2021	5.32	2.2	0.3	0.6	0.2-5.32	0.0-0.2
15MW7	7/9/2021	5.41	2.42	0.3	0.6	0.2-5.41	0.0-0.2
15MW8	7/9/2021	5.39	2.34	0.3	0.6	0.2-5.39	0.0-0.2
15MW9	7/9/2021	5.27	2.24	0.3	0.6	0.2-5.27	0.0-0.2
15MW12**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15MW16**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW16-01	7/9/2021	2.54	2.34	0.3	0.8	0.2-2.54	0.0-0.2
MW16-02**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW16-03**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW16-04**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW17-01	7/9/2021	2.78	1.19	0.3	0.8	0.2-2.78	0.0-0.2
MW19-01**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW19-02	7/9/2021	4.23	2.36	0.3	0.5	0.2-4.23	0.0-0.2

Notes:

'mbgs' - meters below ground surface

'mbtoc' - meters below top of casing

'N/A' - measurement not available

*TH1 to TH7, were previously destroyed by other consultants.

**15MW5, 15MW12, 15MW16, MW16-02, MW16-03, MW16-04, MW19-01 (off-site well) were destroyed during the remedial excavation that took place at the site (AECOM 2019).

***15MW1 has never been located or sampled by AECOM and therefore is assumed to be destroyed or decommissioned by other consultants.

Client: Imperial Oil

Project No.: 1747

Location: Liverpool, N.S.

Logged By: G. Chisholm

Test Pit No.: TP-18

Depth (m)	Strata Plot	Description	Depth/Elev.	Sample No.	Sample Type	Well Data	Field Headspace Test	Depth (m)
0		Ground Surface	0					0
		Light grey sand and cobbles. At 0.9 to 1.0m, dark brown organic matter, rootmat and silty sand. 4" cast iron line at 1.0 m. depth.	-1	1	Grab		110 ppm	1
1		Foreign debris (wood, wire) at 1.0-1.5m mixed with dark brown silty sand grading to medium brown sand and gravel.	-1.5	2	Grab		7% LEL*	1
		Gravel and boulders. Wet at 2.0m. Hydrocarbon odour at 2.0m.	-2					2
2				3	Grab		200 ppm	2
		Sand and gravel with hydrocarbon sheen.		4	Grab		220 ppm	3
3			-3.6					
		Grey sand, wet.		5	Grab		250 ppm	4
4			-4.2					4
		End of Hole						5
5								5

Testing Co: Philip Environmental Services

Casing Dia.: 50mm

Testing Method: Excavator

Casing Elevation: 1.015 masl

Testing Date: Dec. 17, 1997

Sheet: 1 of 1

MGI

MGI Limited
Suite 14
192 Joseph Zatzman Drive
Dartmouth, N.S. B3B 1N4

Client: Imperial Oil

Project No.: 1747

Location: Liverpool, N.S.

Logged By: G. Chisholm

Test Pit No.: TP-28

Depth (m)	Strata Plot	Description	Depth/Elev.	Sample No.	Sample Type	Well Data	Field Headspace Test	Depth (m)
0		Ground Surface	0					0
		Light grey/brown sand and gravel fill. cobbles.	-0.3					
		Black organic matter layer at 0.3 m. Dark brown sand and gravel, cobbles. Hydrocarbon odour.		1	Grab		345 ppm*	
1			-1.2					1
		Light brown/red brown sand grading to light grey sand with quartzite cobbles, numerous boulders. Water entering at 1.5m.		2	Grab		130 ppm	
2								2
			-2.4	3	Grab		75 ppm	
		End of Hole						
3								3
4								4
5								5

Testing Co: Philip Environmental Services

Casing Dia.: 50 mm

Testing Method: Excavator

Casing Elevation: 0.583 masl

Testing Date: Dec. 17, 1997

Sheet: 1 of 1

MGI

MGI Limited
Suite 14
192 Joseph Zatzman Drive
Dartmouth, N.S. B3B 1N4

Client: Imperial Oil

Project No.: 1747

Location: Liverpool, N.S.

Logged By: G. Chisholm

Test Pit No.: TP-32

Depth (m)	Strata Plot	Description	Depth/Elev.	Sample No.	Sample Type	Well Data	Field Headspace Test	Depth (m)
0		Ground Surface	0					0
		Medium brown sandy gravel fill.	-0.3					
		Light brown sandy gravel grading to black sandy gravel and boulders.	-1	1	Grab		40 ppm	
1		Black silty organics.	-1.3					1
		Medium brown sand and gravel, boulders.	-2	2	Grab		40 ppm	
2		Light grey sand with quartzite cobbles. Water at 2.0m.	-3	3	Grab		55 ppm*	
3		End of Hole						3
4								4
5								5

Testing Co: Philip Environmental Services

Testing Method: Excavator

Testing Date: Dec. 17, 1997

Casing Dia.: 50mm

Casing Elevation: 0.924 masl

Sheet: 1 of 1



MGI Limited
Suite 14
192 Joseph Zatzman Drive
Dartmouth, N.S. B3B 1N4

Monitor well: TP-45/TH-4

Client: Imperial Oil

Project No: 1747

Location: Liverpool, NS

Logged By: Chris Major

MGI

Depth (m)	Strata Plot		Number	Type	Gastech Reading	Well Data	Comments
0		Ground Surface					
		Black/brown silty sand with gravel and boulders	1	Grab	60 ppm		50 mm PVC Casing Bentonite
1		Dark brown fine grained silty sand and organics Slight hydrocarbon odour	2	Grab	190 ppm		50 mm PVC screen
		Thick boulder layer with brown sand Water @ 1.4m	3	Grab	220 ppm		
2			4	Grab	180 ppm		End Cap
		EOH					
3							

Contractor: Paddy Excavation

Method: Excavator

Date: May 23, 2001

Hole Size: 2 m

TOC Elevation: 3.29m

MGI Limited
31 Gloster Court
Dartmouth, N.S.
B3B 1X9

Monitor well: TP-46/TH-5

Client: Imperial Oil

Project No: 1747

Location: Liverpool, NS

Logged By: Chris Major

MGI

Depth (m)	Strata Plot		Number	Type	Gastech Reading	Well Data	Comments
0		Ground Surface					
		Dark brown fine grained to medium grained sand with gravel and cobbles	1	Grab	60 ppm		50 mm PVC Casing
1			2	Grab	125 ppm		Bentonite
		Black silty sand and organics (peat)	3	Grab	100 ppm		50 mm PVC screen
2			4	Grab	75 ppm		
		Light brown/grey fine grained sand with gravel and boulders	5	Grab	25 ppm		End Cap
3		EOH					

Contractor: Paddy Excavation

Method: Excavator

Date: May 23, 2001

Hole Size: 2 m

TOC Elevation: 3.25 m

MGI Limited
31 Gloster Court
Dartmouth, N.S.
B3B 1X9

Monitor well: TP-48/TH-6

Client: Imperial Oil

Project No: 1747

Location: Liverpool, NS

Logged By: Chris Major

MGI

Depth (m)	Strata Plot		Number	Type	Gastech Reading	Well Data	Comments
0		Ground Surface					
		Dark brown medium grained sand, and cobbles	1	Grab	25 ppm		50 mm PVC Casing
		Concrete and metal					
1		Light brown medium grained sand with gravel and boulders Water @ 1.1m	2	Grab	25 ppm		Bentonite
		Bedrock, or large boulder					
2		EOH					50 mm PVC screen
3							End Cap

Contractor: Paddy Excavation

Method: Excavator

Date: May 23, 2001

Hole Size: 2 m

TOC Elevation: 3.475 m

MGI Limited
31 Gloster Court
Dartmouth, N.S.
B3B 1X9

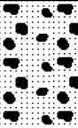

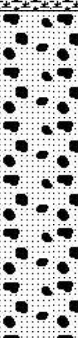
MGI


Logged By: Chris Major

Contractor: Paddy Excavation	Hole Size: 2 m	MGI Limited 31 Gloster Court Dartmouth, N.S. B3B 1X9
Method: Excavator	TOC Elevation: 3.29 m	
Date: May 23, 2001		

BOREHOLE LOG

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	BOREHOLE: 15MW1
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia		START DATE: 2015/05/26
CLIENT: Imperial	GRADE ELEV.: NA	COMPLETION DATE: 2015/05/26
BENCHMARK: NA		PAGE: 1 of 1

Depth (m) Water Level	STRATIGRAPHY DESCRIPTION	MATERIAL TYPE	NUMBER	SAMPLE TYPE	"N" VALUE	RECOVERY %	SAMPLE NAME/ LAB ANALYSIS	SOIL VAPOUR CONCENTRATION	SOIL VAPOUR CONCENTRATION	COMMENTS	Depth (ft) Water Level
								(ppm)	(%LEL)		
								100 300 500 700 900	10 30 50 70 90		
0	Ground Surface										0
	FILL: Sand, gravel, cobbles and boulders		1	G	-	-					1
	ORGANICS: Black-brown, sandy silty organics										2
1	FILL: Boulders, cobbles, sandy gravel		2	G	-	-					3
			3	G	-	-					4
			4	G	-	-	15MW1(1.8-2.4 m) BTEX/mTPH				5
2											6
											7
											8
3	END OF BOREHOLE 2.4 m * NOTE: Location 15MW1 was daylighted and intended to be installed as a monitor well, however due to its proximity to overhead power lines, the hole could not be safely advanced during the drilling portion of the Phase 2 ESA.										9
											10
											11
											12
											13
4											14
											15
											16
5											17
											18
											19
6											

 <div> 45 Akerley Blvd Dartmouth, NS B3B 1J7 </div>	LOGGED BY: SJ	DAYLIGHTING TO: 2.4 m	GAS METER TYPE: RKI Eagle
	REVIEWED BY: SL	EQUIPMENT: NA	
	DRAFTED BY: KG	METHOD: NA	BOREHOLE DIA: 30 cm

MONITORING WELL LOG

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW2
LOCATION: 181 Henry Hensley Street, Liverpool, Nova Scotia	TPC ELEV.: 2.12 mald	START DATE: 2015/06/24
CLIENT: Imperial	GRADE ELEV.: 1.40 mald	COMPLETION DATE: 2015/06/24
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

Depth (m) Water Level	STRATIGRAPHY DESCRIPTION	MATERIAL TYPE	NUMBER	SAMPLE TYPE	"N" VALUE	RECOVERY %	SAMPLE NAME/ LAB ANALYSIS	SOIL VAPOUR CONCENTRATION					SOIL VAPOUR CONCENTRATION					COMMENTS AND MONITORING WELL NOTES	SLOTTED PIEZOMETER	Depth (ft) Water Level
								100	300	500	700	900	10	30	50	70	90			
0	Ground Surface																			
	SILTY SAND:Dark brown,with organics at top, trace gravel		1	SS	7	21	15MW2(0.6-1.2 m) BTEX/mTPH													
			2	SS	7	13														
	BOULDERS Core																			
	SILTY SAND: grey with trace gravel, cobbles, boulders		3	SS	50 5"	13	15MW2(3.0-3.6 m) BTEX/mTPH													
	BOULDERS																			
2	Core																			
3	SILTY SAND: grey with trace gravel, cobbles, boulders		4	SS	74 9"	46														
	BOULDERS Core																			
4	Core		5	SS	50 3"	0														
	END OF BOREHOLE 4.5 m																			
5																				



45 Akerley Blvd
Halifax, NS
B3B 1J7

LOGGED BY: MF

REVIEWED BY: SL

DRAFTED BY: KG

DAYLIGHTING TO: NA

EQUIPMENT: CME 55 Rubber Tire Truck Mount

METHOD: Coring

GAS METER TYPE: RKI Eagle

BOREHOLE DIA: 15 cm

MONITORING WELL LOG

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW3
LOCATION: 181 Henry Hensley Street, Liverpool, Nova Scotia	TPC ELEV.: 2.40 mald	START DATE: 2015/06/24
CLIENT: Imperial	GRADE ELEV.: 1.67 mald	COMPLETION DATE: 2015/06/24
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

Depth (m) Water Level	STRATIGRAPHY DESCRIPTION	MATERIAL TYPE	NUMBER	SAMPLE TYPE	"N" VALUE	RECOVERY %	SAMPLE NAME/ LAB ANALYSIS	SOIL VAPOUR CONCENTRATION					SOIL VAPOUR CONCENTRATION					COMMENTS AND MONITORING WELL NOTES	SLOTTED PIEZOMETER	Depth (ft) Water Level
								100	300	500	700	900	10	30	50	70	90			
																			</	



45 Akerley Blvd
Halifax, NS
B3B 1J7

LOGGED BY: MF

REVIEWED BY: SL

DRAFTED BY: KG

DAYLIGHTING TO: NA

EQUIPMENT: CME 55 Rubber Tire Truck Mount

METHOD: Coring

GAS METER TYPE: RKI Eagle

BOREHOLE DIA: 15 cm

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW5
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia	TPC ELEV.: 2.67 mald	START DATE: 2015/06/23
CLIENT: Imperial	GRADE ELEV.: 1.72 mald	COMPLETION DATE: 2015/06/23
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

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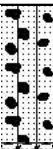
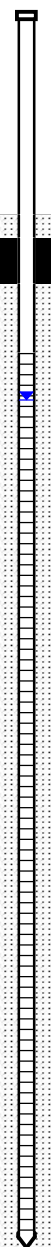



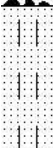
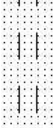


DRAFTED BY: KG

METHOD: Coring

BOREHOLE DIA: 15 cm

MONITORING WELL LOG

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW6
LOCATION: 181 Henry Hensley Street, Liverpool, Nova Scotia	TPC ELEV.: 2.39 mald	START DATE: 2015/06/24
CLIENT: Imperial	GRADE ELEV.: 1.61 mald	COMPLETION DATE: 2015/06/24
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

Depth (m) Water Level	STRATIGRAPHY DESCRIPTION	MATERIAL TYPE	NUMBER	SAMPLE TYPE	"N" VALUE	RECOVERY %	SAMPLE NAME/ LAB ANALYSIS	SOIL VAPOUR CONCENTRATION					SOIL VAPOUR CONCENTRATION	COMMENTS AND MONITORING WELL NOTES	SLOTTED PIEZOMETER	Depth (ft) Water Level	
								(ppm) 100 300 500 700 900									(%LEL) 10 30 50 70 90
	Ground Surface																
0	FILL: Silty sand, grey-brown with gravel		1	SS	10	25	15MW6(0.6-1.2 m) BTEX/mTPH							Potentiometric surface elevation 2015/07/02		-2	
	ORGANICS: Dark brown		2	SS	14	17											-1
1	BOULDERS		3	SS	62 6"	0											0
	Core															1	
	SILTY SAND: Grey-brown with trace gravel		4	SS	40	67	15MW6(2.4-3.0 m) BTEX/mTPH							Monitor well installed to 4.5 m, 50 mm PVC casing, screened from 0.6-4.5 m		2	
3			5	SS	75	83	15MW6(3.0-3.6 m) BTEX/mTPH									3	
	BOULDERS		6	SS	R	0										4	
4	Core															5	
	END OF BOREHOLE 4.5 m															6	
																7	
																8	
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																10	
																11	
																12	
																13	
																14	
																15	
																16	



45 Akerley Blvd
Halifax, NS
B3B 1J7

LOGGED BY: MF

REVIEWED BY: SL

DRAFTED BY: KG

DAYLIGHTING TO: NA

EQUIPMENT: CME 55 Rubber Tire Truck Mount

METHOD: Coring

GAS METER TYPE: RKI Eagle

BOREHOLE DIA: 15 cm

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW7
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia	TPC ELEV.: 2.49 mald	START DATE: 2015/06/25
CLIENT: Imperial	GRADE ELEV.: 1.59 mald	COMPLETION DATE: 2015/06/25
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

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45 Akerley Blvd
Halifax, NS
B3B 1J7

LOGGED BY: MF

REVIEWED BY: SL

DRAFTED BY: KG

DAYLIGHTING TO: NA

EQUIPMENT: CME 55 Rubber Tire Truck Mount

METHOD: Coring

GAS METER TYPE: RKI Eagle

BOREHOLE DIA: 15 cm

MONITORING WELL LOG

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW8
LOCATION: 181 Henry Hensley Street, Liverpool, Nova Scotia	TPC ELEV.: 2.50 mald	START DATE: 2015/06/22
CLIENT: Imperial	GRADE ELEV.: 1.67 mald	COMPLETION DATE: 2015/06/22
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

Depth (m) Water Level	STRATIGRAPHY DESCRIPTION	MATERIAL TYPE	NUMBER	SAMPLE TYPE	"N" VALUE	RECOVERY %	SAMPLE NAME/ LAB ANALYSIS	SOIL VAPOUR CONCENTRATION					SOIL VAPOUR CONCENTRATION	COMMENTS AND MONITORING WELL NOTES	SLOTTED PIEZOMETER	Depth (ft) Water Level
								(ppm) 100 300 500 700 900								



45 Akerley Blvd
Halifax, NS
B3B 1J7

LOGGED BY: MF

REVIEWED BY: SL

DRAFTED BY: KG

DAYLIGHTING TO: NA


EQUIPMENT: CME 55 Rubber Tire Truck Mount

METHOD: Hollow Stem Auger/Coring

GAS METER TYPE: RKI Eagle

BOREHOLE DIA: 20 cm

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW9
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia	TPC ELEV.: 2.47 mald	START DATE: 2015/06/25
CLIENT: Imperial	GRADE ELEV.: 1.61 mald	COMPLETION DATE: 2015/06/25
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

 <div> 45 Akerley Blvd Halifax, NS B3B 1J7 </div>	LOGGED BY: MF	DAYLIGHTING TO: NA	GAS METER TYPE: RKI Eagle
	REVIEWED BY: SL	EQUIPMENT: CME 55 Rubber Tire Truck Mount	
	DRAFTED BY: KG	METHOD: Coring	BOREHOLE DIA: 15 cm

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW12
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia	TPC ELEV.: 1.48 mald	START DATE: 2015/05/26
CLIENT: Imperial	GRADE ELEV.: 1.51 mald	COMPLETION DATE: 2015/06/25
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

[illegible]

45 Akerley Blvd
Halifax, NS
B3B 1J7

DRAFTED BY: KG

METHOD: Coring

BOREHOLE DIA: 15 cm

PROJECT: Phase 2 Environmental Site Assessment	REF. NO: 087042	MONITOR WELL: 15MW16
LOCATION: 181 Henry Hensey Street, Liverpool, Nova Scotia	TPC ELEV.: 2.34 mald	START DATE: 2015/05/26
CLIENT: Imperial	GRADE ELEV.: 1.61 mald	COMPLETION DATE: 2015/06/24
BENCHMARK: Top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald		PAGE 1 of 1

[illegible]

45 Akerley Blvd
Halifax, NS
B3B 1J7

DRAFTED BY: KG

METHOD: Coring

BOREHOLE DIA: 15 cm

LOCATION: 181 Henry Hensley Drive, Liverpool, Nova Scotia

CONTRACTOR: Lantech Drilling Services Inc.

SHEET 1 OF 1




EQUIPMENT USED: Hollow Stem, Track Mounted CME-55

OVM TYPE: RKI Eagle

BORING DATE: July 7, 2016

RECORD OF MONITORING WELL: MW16-01

DATUM: Relative elevations are referenced to the top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald based on NSSCM 221033 (GHD 2015).

DEPTH SCALE METRES	SOIL PROFILE			SAMPLES			Soil Vapour Concentration (ppmv)				ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION Stickup = 1.08 m
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	⊕					
							50 100 150 200					
							Soil Vapour Concentration (%LEL) □					
						20	40	60	80			
0	Ground Surface		1.63									
	GRAVEL and SILTY SAND, very loose, dry, light brown		0.00									
				1	SS	10	⊕				METALS PAH, VOC	Bentonite Chips
			1.03									
	GRAVEL, some organics, soft to loose, black		0.60									
				2	SS	10	⊕				PHC	Sand
1												
				3	SS	5	⊕				PHC	Slotted Section
	--- Refusal at 1.7 m due to boulder		-0.07									
	End of MONITORING WELL.		1.70									
2												
3												
4												
5												

DEPTH SCALE

1 : 25



LOGGED: JR

CHECKED: CV/SC

IOL (AUTO) 1544455-1235_BH_LOGS.GPJ IOLGDT 7/27/16

LOCATION: 181 Henry Hensley Drive, Liverpool, Nova Scotia

CONTRACTOR: Lantech Drilling Services Inc.

SHEET 1 OF 1

EQUIPMENT USED: Solid Stem, Track Mounted CME-55

OVM TYPE: RKI Eagle

BORING DATE: July 7, 2016

RECORD OF MONITORING WELL: MW16-02

DATUM: Relative elevations are referenced to the top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald based on NSSCM 221033 (GHD 2015).

DEPTH SCALE METRES	SOIL PROFILE			SAMPLES			Soil Vapour Concentration (ppmv)				ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION Stickup = 0.94 m	
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	50	100	150	200			
							Soil Vapour Concentration (%LEL)						
							20	40	60	80			
0	Ground Surface		1.77										
	SAND and GRAVEL, loose, dry, grey-brown		0.00										
				1	SS	15	⊕						Bentonite Chips
			1.17										
	SAND, organics, loose, moist, black		0.60										Sand
				2	SS	15			⊕		METALS PAH, PHC, VOC		
1	BOULDERS		0.77										
			1.00										
			0.57										
	GRAVEL and SAND, loose, dry, black		1.20										Slotted Section
				3	SS	10	□				PHC		
	--- Refusal at 1.7 m due to boulder		0.07										Sand
	End of MONITORING WELL.		1.70										
2													

DEPTH SCALE

1 : 25



LOGGED: JR

CHECKED: CV/SC

IOL (AUTO) 1544455-1235_BH_LOGS.GPJ IOL.GDT 7/27/16

DATUM: Relative elevations are referenced to the top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald based on NSSCM 221033 (GHD 2015).

SHEET 1 OF 1

RECORD OF MONITORING WELL: MW16-03

IOL (AUTO) 1544455-1235 BH LOGS.GPJ IOL.GDT 7/27/16

1 : 25



CHECKED: CV/SC

LOCATION: 181 Henry Hensey Drive, Liverpool, Nova Scotia

CONTRACTOR: Lantech Drilling Services Inc.

EQUIPMENT USED: Hollow Stem, Track Mounted CME-55

OVM TYPE: RKI Eagle

BORING DATE: July 7, 2016

DATUM: Relative elevations are referenced to the top of fire hydrant located near 15MW12 with an assumed elevation of 2.362 mald based on NSSCM 221033 (GHD 2015).

SHEET 1 OF 1

RECORD OF MONITORING WELL: MW16-04

DEPTH SCALE METRES	SOIL PROFILE			SAMPLES			Soil Vapour Concentration (ppmv)				ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION Stickup = 0.87 m	
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY %	Soil Vapour Concentration (ppmv)						
							Soil Vapour Concentration (%LEL)						
							50	100	150	200			
							20	40	60	80			
0	Ground Surface SAND and GRAVEL, loose, dry, grey		1.71 0.00										
				1	SS	2	⊕						Bentonite Chips
				2	SS	5	⊕						Sand
1													
				3	SS	2	⊕						9-Jul-2016 ▽ Slotted Section
	ORGANICS, soft, wet, black		-0.09 1.80										
2	SANDSTONE, soft, wet, light grey		-0.29 2.00	4	SS	10	⊕					PHC	
	--- Refusal at 2.4 m due to boulder			5	SS	5	⊕					PHC	Sand
	End of MONITORING WELL.		-0.69 2.40										
3													
4													
5													

DEPTH SCALE

1 : 25



LOGGED: JR

CHECKED: CV/SC

IOL (AUTO) 1544455-1235_BH_LOGS.GPJ IOL.GDT 7/27/16

BOREHOLE LOG	PROJECT: 60549588	BOREHOLE: MW17-01 1 of 1
IOL Cross-Canada Cost to Closure 181 Henry Hensey Dr, Liverpool, NS Client: Imperial Oil Ltd	Northing: N/A Easting: N/A Methodology: S.Spoon, Auger Contractor: Nova Drilling	DATE: 2 November 2017 LOGGED BY: CH REFERENCE: N/A m Above Datum

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS	WATER LEVEL	SAMPLE				COMMENTS
					NUMBER	INTERVAL	TYPE	VAPOUR (ppm)	
0.6		<u>SAND</u> -Silty sand with gravel. Brown and grey. Loose. Dry.			1		SS		
1		-Brown. Firm. Damp.			2		SS		
1.2		<u>PEAT</u> -Peat-like. Dark brown.			3		SS		No soil retained in spoon: 1.2-1.8 mbgs
1.8		<u>SAND</u> -Silty sand with trace gravel. Woody debris present. Dark brown. Soft. Wet.			4		SS		
2.4		<u>ASSUMED ROCK MATERIAL</u> -Possible boulder or cobbles.							Augered: 2.4-2.7 mbgs
3.0									EOH = 3.0 mbgs

PROJECT: Imperial Oil Cost to Closure - Cross Canada				CLIENT: Imperial Oil Ltd.				TESTHOLE NO: MW19-01			
LOCATION: 181 Henry Hensey Drive, Liverpool, NS								PROJECT NO.: 60549588			
CONTRACTOR: Nova Drilling Inc.				METHOD: Standard Auger and Hydroexcavation				ELEVATION (m): N/A			
SAMPLE TYPE		<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY	<input type="checkbox"/> CORE				
BACKFILL TYPE		<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS	<input type="checkbox"/> SAND				

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm)			COMMENTS	DEPTH (m)
					10	100	1000		
0		<u>SAND</u> - Brown sand with cobble							
1									1
2									2
3									3
4		End of borehole at 3.66 mbgs Assumed bedrock at 3.66 mbgs							4
5									5

	LOGGED BY: Alex Duguay	COMPLETION DEPTH: 3.66 m
	REVIEWED BY: Janice Shea	COMPLETION DATE: 4/30/19
	PROJECT ENGINEER: Alex Duguay	Page 1 of 1

Sample:
MW19-01_0.5-0.9
Analysis: PHC, Metals
(Lead only)

Standard auger drilling
from 1.83 mbgs to 3.66
mbgs

ENVIRONMENTAL (VAPOUR ONLY) 2019-06-05-LIVERPOOL BH LOGS-60549588-NL.GPJ UMA.GDT 6/6/19

PROJECT: Imperial Oil Cost to Closure - Cross Canada				CLIENT: Imperial Oil Ltd.				TESTHOLE NO: MW19-02			
LOCATION: 181 Henry Hensey Drive, Liverpool, NS								PROJECT NO.: 60549588			
CONTRACTOR: Nova Drilling Inc.				METHOD: Standard Auger				ELEVATION (m): N/A			
SAMPLE TYPE		<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY	<input type="checkbox"/> CORE				
BACKFILL TYPE		<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS	<input type="checkbox"/> SAND				

DEPTH (m)	WELL INSTALLATION	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	⊗ Vapour Reading ⊗ (ppm)			COMMENTS	DEPTH (m)
						10	100	1000		
0			<u>SAND</u> - Brown sand with gravel, large cobble throughout							
1										
2			Hydroexcavator refusal at 1.83 mbgs Assumed bedrock at 1.83 mbgs						Drilled through former backfill. No soil samples collected.	
3										
4			End of borehole at 4.11 mbgs							
5										

AECOM	LOGGED BY: Alex Duguay	COMPLETION DEPTH: 4.11 m
	REVIEWED BY: Janice Shea	COMPLETION DATE: 4/29/19
	PROJECT ENGINEER: Alex Duguay	Page 1 of 1





Photo No. 1	Date (mm/dd/yyyy): 07/09/2021	
Description: Monitoring well 15MW2 prior to decommissioning.		
Photo No. 2	Date (mm/dd/yyyy): 07/09/2021	
Description: Monitoring well 15MW2 post decommissioning.		

Photo No. 3	Date (mm/dd/yyyy): 07/09/2021	 <p>A photograph showing a monitoring well (15MW7) in a field. The well is a vertical metal pipe with a white cap, surrounded by tall grass and weeds. A chain-link fence is visible in the background.</p>
Description: Monitoring well 15MW7 prior to decommissioning.		
Photo No. 4	Date (mm/dd/yyyy): 07/09/2021	 <p>A photograph showing the same monitoring well (15MW7) after decommissioning. The well is no longer visible, and the area is covered with tall grass and weeds. An orange traffic cone is placed near the well's location. A chain-link fence is visible in the background.</p>
Description: Monitoring well 15MW7 post decommissioning.		

WORK PERMIT

WORK PERMIT DURATION MAY NOT EXCEED 16 HOURS PER DAY.
WORK PERMIT MAY BE REVALIDATED UP TO 7 DAYS FOR NON-HRC WORK.

A. Location and type of work to be performed:

Permit #: GEN 2021-07-09

Issue Date: July 9, 2021 Time: 8:00am ☐ AM ☐ PM Expiration Date: July 9, 2021 Time: 3:00pm ☐ AM ☐ PM

Specific Location: 181 Henry Hensley Dr, Liverpool, NS Extension Time: ☐ AM ☐ PM
Work Description (Specify Work Activities): GW Monitoring Well Decommissioning. Extension Approval: ☐ Verbal Approval
Signature: _____

Supervisor: Justin Ogden Supervisor Phone #: 782-640-1626

Site First Aid / Emergency Phone #:911 # of Workers: 2

Has short service worker(s) (SSW) received orientation? ☐ Yes ☐ No ☐ N/A YES

Does SSW have a designated mentor? ☐ Yes ☐ No ☐ N/A JO

B. Complete the Permit and Applicable Higher Risk Checklist(s) HRC, if applicable

☐ Confined Space ☐ Working at Heights ☐ Hot Work ☐ Working Near Moving Equipment
☐ Energy Isolation ☐ Lifting & Rigging ☐ Excavation

C. Pre-Work Checklist (jobsite inspection required):

	Yes	N/A
1. Has the impact of this task on neighboring equipment, services and third parties been considered and addressed?	YES	
2. Has the work activity, safety concerns and emergency procedures work been discussed with the local site contact?	Yes	
3. Have procedures for working with Hazardous Materials been reviewed and are understood by workers (e.g. Chemical approval/SDS, Asbestos controls, etc.)?	Yes	
4. Is emergency equipment available, per plan (e.g. Fire Extinguisher, Radio, Rescue Harness, etc.)?	Yes	
5. Are standby personnel trained and understand their responsibilities? <input type="checkbox"/> Spotter <input type="checkbox"/> Hazard Watch	Yes	
6. Has work area been evaluated for hazards (overhead, behind walls, below ground, etc.) with plan to mitigate hazards prior to starting work?	Yes	
7. Have you confirmed PPE identified during planning is available and in good condition?	Yes	
8. Have SIMOP hazards been identified and discussed with impacted personnel (List SIMOPs at bottom of page)?	Yes	

D. If there is a potential hazardous atmosphere or hazardous substance present, complete the Gas Test Supplement

E. Site Setup (work may not begin until these are completed)

	Yes	N/A
9. Overhead utility lines and minimum clearance requirements reviewed with site workers?	Yes	
10. Appropriate warning signs, temporary lighting and barricades have been considered to protect workers, prevent unauthorized access and establish work zone?	Yes	

F. Signatures (sign at work location before beginning work) If issuer/recipient changes, new issuer/recipient reviews and signs.

☐ I have reviewed this checklist and all work arrangements with all workers involved and discussed work scope with local site contact as applicable. I verify I understand the purpose of the permit and applicable higher risk checklists.

Local Site Contact (if applicable): Justin Ogden Contact Phone #: 782-640-1626

Issuer Company: AECOM

Issuer / Relief Name: Justin Ogden Issuer Phone #:

Recipient Company: AECOM



Recipient / Relief Name: David Bugden Recipient Phone #:

G. Permit Compliance Inspection (required each day) If additional space is needed use bottom/back of form.

Date:	Time:	<input type="checkbox"/> AM <input type="checkbox"/> PM	Performed By:	Comments:
Date:	Time:	<input type="checkbox"/> AM <input type="checkbox"/> PM	Performed By:	Comments:
Date:	Time:	<input type="checkbox"/> AM <input type="checkbox"/> PM	Performed By:	Comments:

H. Post Work / Job Status Permit issuer (or relief) is to sign off at end of work/shift

Has the work site been inspected? ☐ Yes ☐ No YES
Discussed work activity status w/ local contact? ☐ Yes ☐ No ☐ N/A YES
Is anything out of service and has everything been returned to safe condition? ☐ Yes ☐ No ☐ N/A YES
Higher risk checklist(s) closeout completed? ☐ Yes ☐ No ☐ N/A N/A
Area/equipment/load secured, cleaned and returned to safe condition? ☐ Yes ☐ No YES

Permit Issuer
(or relief): Print: Justin Ogden Signature:  Date: July 9, 2021
Permit Recipient
(or relief): Print: David Bugden Signature:  Date: July 9, 2021
Local Site Contact
(as applicable): Print: Signature: Date:

Use this space to capture SIMOPS hazards and other site specific hazards and mitigation strategies:

Prominently display permit at job site, if possible. Retain according to local regulations.