

June 10, 2019

Armco Capital Inc.

145 Hobsons Lake Drive, Suite 400
Halifax, Nova Scotia B3S 0H9

Attn: Mr. Dmitrii Pivovarov – Project Manager, Development

Subject: Environmental Test Pit Investigation

Berry Hills Phase 8 (Portion of PID No. 41071069), Middle Sackville, Nova Scotia
Project No.: 1900384-00-0

Dear Mr. Pivovarov;

Englobe Corp. (Englobe) was retained by Armco Capital Inc. (Armco) to conduct an environmental test pit investigation at the above-noted property. This report provides the details of the investigation.

1 BACKGROUND

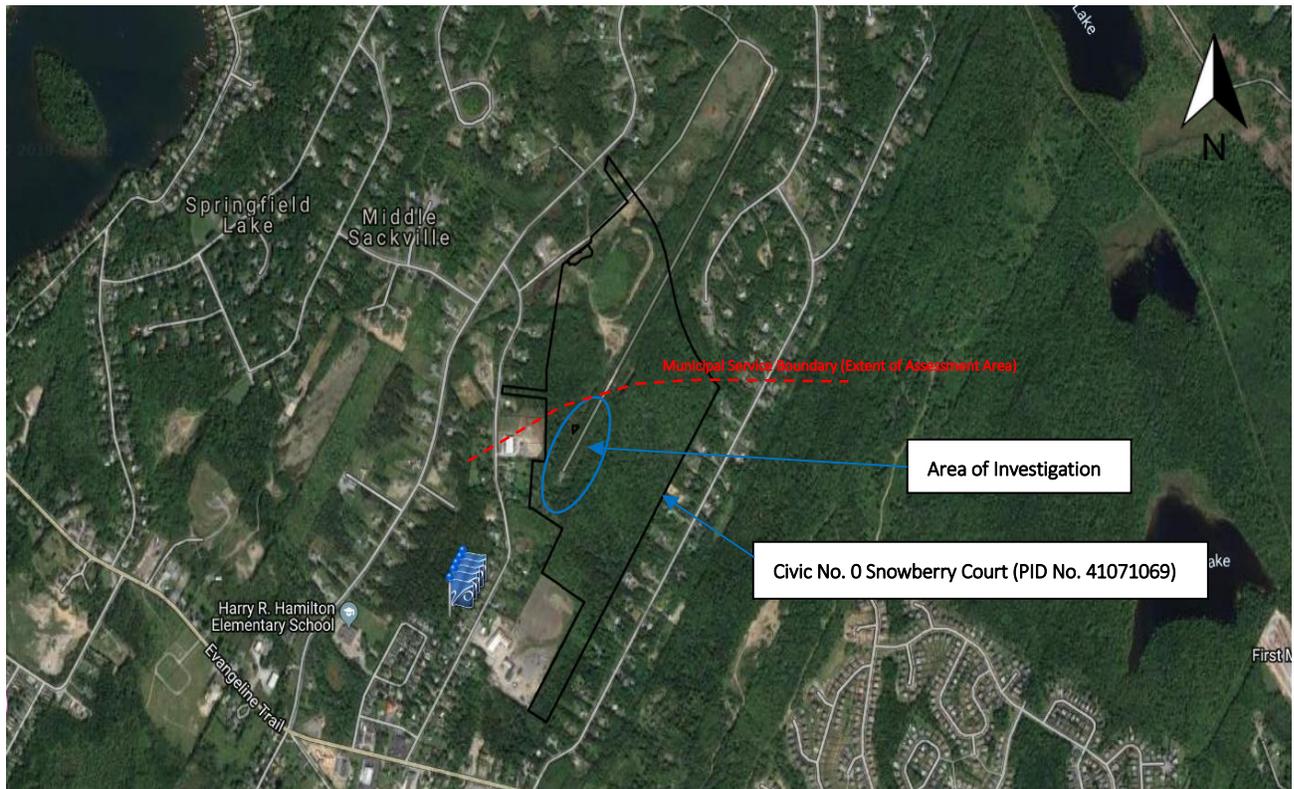
Englobe conducted a Phase I Environmental Site Assessment (ESA) on behalf of Armco (report dated January 12, 2018) of the property identified by PID No. 41071069. At the time of the assessment, residential development of the property was being considered. Based on information provided by Armco in April 2019, we understand that currently, only the southern half (approximate) of the parcel is proposed for development (the municipal service boundary bisects the property; the northern portion is outside the municipal service area). Based on information gathered and observations made during site reconnaissance, the Phase I ESA revealed potential environmental concerns in the southern portion of the subject property related to the former drag strip and the potential for abandoned vehicles and miscellaneous debris along the former drag strip. Englobe recommended an environmental test pit investigation be completed to assess the potential for impacts from petroleum hydrocarbons (PHCs), metals, and polycyclic aromatic hydrocarbons (PAHs) at the property.

2 SITE DESCRIPTION

The current area of interest is the southern portion of the parcel identified as PID No. 41071069 and listed as Civic No. 0 Snowberry Court, located in Middle Sackville, NS. PID No. 41071069 is an irregular-shaped property with a land area of approximately 37.79 hectares (93.38 acres). A site location map is presented in Figure 2-1, hereafter.

For the purposes of this report, the southern portion of PID No. 41071069 (the area of the property to the south of the municipal service boundary) will be referred to as the “site”.

Figure 2-1 Site Location Map



The site is currently vacant and undeveloped. Areas of PID No. 41071069 were in use as an auto racing facility from 1968 until the late-1980s. An abandoned ¼-mile asphalt drag strip is present on the site. An abandoned oval racetrack and concrete foundations for buildings associated with the former auto racing facility are present on the northern portion of the property. Several fill piles are present throughout the site.

Access to the subject property is from Lively Road to the west and Nicks Lane to the northwest. The site is located in a mixed residential/commercial area of Middle Sackville. The property is bound in all directions by residential streets. Several contracting businesses are present along Lively Road to the west and south of the site.

The site relatively flat with a gradual slope to the southwest starting at approximately the location of the municipal service boundary. The southernmost section of the drag strip is built up approximately 8 meters higher than the surrounding area. Regional topography slopes from north to south toward the Sackville River. The site is currently unserviced. The surrounding properties are serviced with either private potable water wells and septic systems (north of the municipal service boundary) or municipal water and sewer infrastructure provided by Halifax Water (south of the service boundary).

3 TEST PIT PROGRAM

Prior to the commencement of the test pit program, Englobe contacted public utility companies (power, communications, sewer, water and natural gas) with services in the area to have any underground infrastructure at the site located. The purpose of the utility clearances is to reduce the risk of property damage and personal injury by identifying the locations of any buried lines to avoid contacting them during excavation activities. No contact with underground services was reported during the site work.

The purpose of the environmental investigation program was to assess the potential for environmental impacts related to abandoned vehicles or other miscellaneous debris items in the southern portion of the subject property. On May 15, 2019, Englobe personnel supervised the excavation of one test pit at the site by a local contractor (Lively's Construction) using a tracked excavator. Test pit TP1 was located at the south end of the former drag strip at the location of an abandoned car body. Although other car bodies were identified adjacent to the drag strip, the excavator could not access the areas due to the steep slope on the sides of the drag strip. Therefore, on May 16, 2019, Englobe personnel returned to these areas and advanced three shallow test pits by hand (hand sample locations HS1 to HS3). HS1 and HS2 were advanced at the base of the slope for the former drag strip beneath two abandoned cars. HS3 was advanced at the eastern edge of the former drag strip beneath an abandoned car that showed visual evidence of having been burned. The test pit and hand sample locations are shown on Figure 1, Appendix A.

The field investigation was carried out by qualified technical personnel who positioned and logged the test pits and sampled the *in-situ* soils to assess the potential for contamination. A summary of encountered geologic conditions is provided in the Test Pit Logs in Appendix B. It should be noted that the stratigraphic boundaries on the logs typically represent a transition of one soil type to another and do not necessarily indicate an exact plane of geologic change. Subsurface conditions may vary between and beyond the test locations.

Soil samples were placed in lab-supplied, Teflon-lined glass containers (following methanol preservation protocols, where required). The samples were immediately placed in ice-packed coolers and maintained under cool storage. Select soil samples were submitted under chain-of-custody to Maxxam Analytics Inc.'s laboratory (Maxxam) in Bedford, NS for analysis of total petroleum hydrocarbons (TPH) including benzene, toluene, ethylbenzene and xylenes (BTEX), metals, and polycyclic aromatic hydrocarbons (PAHs).

4 GEOLOGICAL CONDITIONS

Fill was encountered at TP1 and HS3 (located on the built-up area adjacent to the drag strip) that generally consisted of silty sand with some gravel and clay and occasional cobbles and boulders and was loose to compact, moist to wet and brown. At HS1 and HS2, which were located at the base of the built-up former drag strip (east side) in a wooded area, till was encountered. The till generally consisted of silty sand with some clay and occasional cobbles and boulders and was loose to compact, moist to wet and brown.

Groundwater was encountered at depths of 1.5 meters below ground surface (mbgs) at TP1 and 0.3 mbgs at HS1 and HS2. Groundwater was not encountered at HS3. Bedrock was not encountered at any of the test pit locations. No evidence of petroleum hydrocarbon impacts (i.e., sheen, staining, odour) was noted during the program.

5 ANALYTICAL RESULTS

Laboratory results obtained during the test pit program are presented in Tables 1, 2 and 3, Appendix C. Results are presented in conjunction with the 2013 Nova Scotia Environment (NSE) Tier 1 *Environmental Quality Standards* (EQS) for a residential site with non-potable groundwater and coarse-grained soil (based

on the anticipated future use of the land as a residential subdivision with municipal water supply). Given the possibility of potable wells being present at properties to the north of the municipal service boundary in the area of the subject property, the Tier 1 EQS for residential sites with potable groundwater are also provided in the tables. A copy of the laboratory certificate of analysis is provided in Appendix D.

TPH/BTEX in Soil

The laboratory reported no detectable TPH/BTEX parameters in the soil samples submitted from the test locations. These results satisfy the NSE Tier 1 EQS (non-potable and potable).

Metals in Soil

The laboratory reported concentrations of aluminum (TP1) and iron (all samples) that exceed the NSE Tier 1 EQS (non-potable and potable). All other metals results satisfied the Tier 1 EQS, where they exist.

Iron and aluminum (and some other metals) are commonly found naturally at elevated concentrations in many areas of Nova Scotia due to the geochemistry of the soils. The elevated iron and aluminum concentrations at TP1, HS1, and HS3 are interpreted by Englobe to be naturally occurring and do not represent evidence of anthropogenic contamination.

PAHs in Soil

The laboratory reported no detectable PAHs in the soil samples submitted from the test locations. These results satisfy the NSE Tier 1 EQS (non-potable and potable).

6 CONCLUSIONS AND RECOMMENDATIONS

Based on the results obtained and observations made during the test pit program, the environmental investigation conducted in the southern portion of PID No. 41071069 in Middle Sackville, NS has identified no evidence of contamination related to the former drag strip and abandoned vehicles adjacent to the strip. No TPH/BTEX or PAH parameters were detected in soil.

Soil analytical results showed no detectable TPH/BTEX and PAH parameters. Aluminum (TP1) and iron (TP1, HS1, and HS3) were reported in soil at concentrations that exceed the NSE Tier 1 EQS for a residential site with both non-potable and potable groundwater and coarse-grained soil. All other metals results satisfy the NSE Tier 1 EQS, where they exist. Iron and aluminum (and some other metals) are commonly found naturally at elevated concentrations in many areas of Nova Scotia due to the geochemistry of the soils. The elevated iron and aluminum concentrations at TP1, HS1, and HS3 are interpreted by Englobe to be naturally occurring and do not represent evidence of anthropogenic contamination.

Given that the site is proposed for residential development, debris items such as abandoned vehicles should be disposed of at a facility permitted to accept such materials.

7 LIMITATIONS

This report has been prepared by Englobe Corp. for the exclusive use of Armco Capital Inc. Any use that a third party makes of this report, or any reliance on or decisions made based on it, are the sole responsibility of the third party. Englobe accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The statements and conclusions presented in this report are professional opinions based upon visual observations made during the excavation of four test pits, the collection and laboratory analysis of select soil samples, and the interpretation of the chemical analyses.

The environmental investigation conducted by Englobe was limited to the portion of the subject property to the south of the municipal service boundary. The assessment was not intended to assess any potential environmental concerns at the site other than those discussed in this report.

Environmental conditions are dynamic in nature and changing circumstances in the environment and in the use of the property can alter radically the conclusions and information contained herein.

8 CLOSING

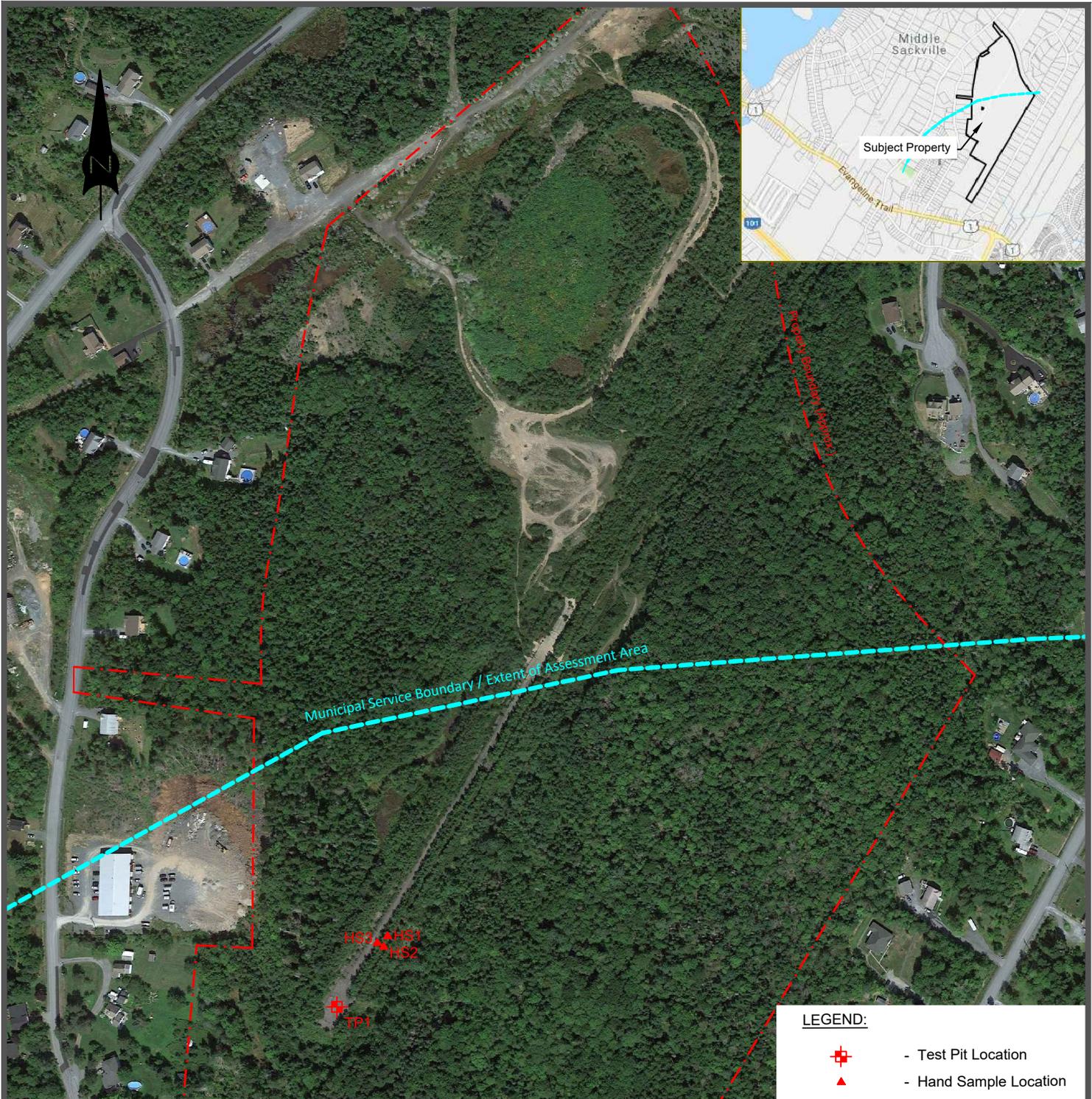
We trust this satisfies your requirements. Should you have any questions or concerns please do not hesitate to ask.

Yours very truly,
Englobe Corp.

Original Signed

Ryan Pellerin, B.Sc., A.Sc.T.
Project Manager, Environmental Engineering

Appendix A: Site Figure



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1	1	June 2019	JJ	RH	RP
No.	Version	Date	By	Verif	Appr.

Armco Capital Inc.

Environmental Test Pit Investigation

Berry Hills Phase 8 (Portion of PID No. 41071069)
Middle Sackville, Nova Scotia

97 Troop Avenue
Dartmouth, NS, B3B 2A7
902-468-6486

Discipline:	Environment	Prepare by:	RH	Verify by:	RH
Scale:	1: 4000	Draw by:	JJ	Approval by:	RP
Date:	June 2019	Figure no:	1		
Page setup:	Paper size:	Register no.:			
Figure 1	Letter				

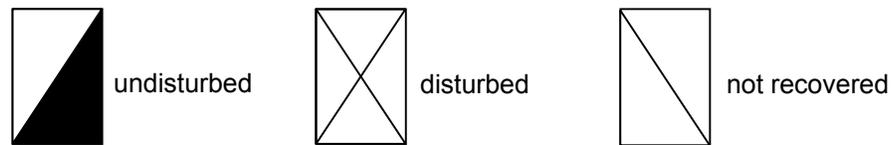
Site Plan Showing Test Pit Locations

Man.	Project	Otp	Project	Phase	Electronic ref.	Rev.
148	1900384	00	0	-	-	-

Appendix B: Test Pit Logs

SOIL SAMPLES

CONDITION – This column graphically indicates the depth and condition of the sample:



TYPE – The type of sample is indicated in this column as follows:

- A auger sample
- B block sample
- C rock core, or frozen soil core
- D drive sample
- G grab sample
- SS split spoon
- P Pitcher tube sample
- U tube sample (usually thin-walled)
- W wash or air return sample
- O other (see report text)

PENETRATION RESISTANCE – Unless otherwise noted this column refers to the number of blows (N) of a 140 pound (63.5 kg) hammer freely dropping 30 inches (0.76 m) required to drive a 2 inch (50.8 mm) O.D. open-end sampler 0.5 feet (0.15 m) to 1.5 feet (0.45 m) into the soil, or until 100 blows have been applied, in which case, the penetration is stated. This is the standard penetration test referred to in ASTM D 1586.

OTHER TESTS

In this column are tabulated results of other laboratory tests as indicated by the following symbols:

*C	Consolidation test
Fines	Percentage by weight smaller than #200 sieve
D _R	Relative density (formerly specific gravity)
k	Permeability coefficient
*MA	Mechanical grain size analysis and hydrometer test (if appropriate)
pp	Pocket penetrometer strength
*q	Triaxial compression test
q _U	Unconfined compressive strength
*SB	Shearbox test
SO ₄	Concentration of water-soluble sulphate
*ST	Swelling test
TV	Torvane shear strength
VS	Vane Shear Strength (undisturbed-remolded)
ε _f	Unit strain at failure
γ	Unit weight of soil or rock
γ _d	Dry unit weight of soil or rock
ρ	Density of soil or rock
ρ _d	Dry density of soil or rock

* The results of these tests usually are reported separately

SYMBOLS AND TERMS USED ON THE BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidation of clay minerals, shrinkage cracks etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating layers or different soil types, e.g. silt and sand or silt and clay
Well Graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	- predominantly of one grain size.

Terminology used for describing soil strata based upon the proportion of individual particle size present:

Trace, or occasional	Less than 10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. silt and sand)	35-50%

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' - value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil.

Relative Density	'N' Value	Relative Density %
Very loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression test, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength		'N' Value
	Kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

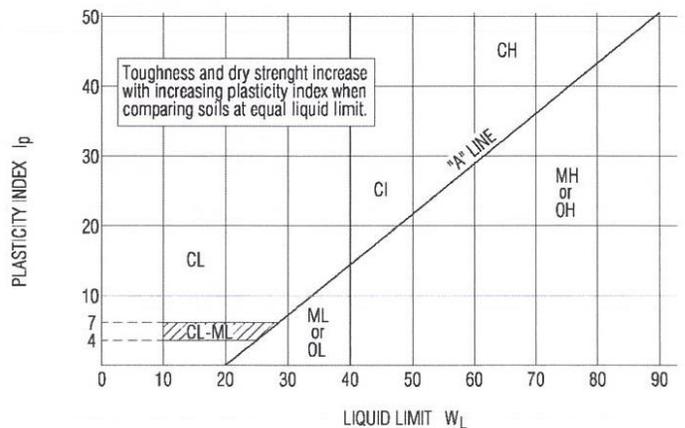
MAJOR DIVISION		GROUP SYMBOL	GRAPHIC SYMBOL	COLOR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
HIGHLY ORGANIC SOILS		Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE	
COARSE-GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS MORE THAN HALF COARSE FRACTION LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS	GW		RED	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 4$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$
			GP		RED	POORLY-GRADED GRAVELS, AND GRAVEL-SAND MIXTURES, <5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS
		DIRTY GRAVELS	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW 'A' LINE OR $I_p < 4$
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE 'A' LINE OR $I_p > 7$
	SANDS MORE THAN HALF COARSE FRACTION SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS	SW		RED	WELL-GRADED SANDS, GRAVELLY SANDS, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 6$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$
			SP		RED	POORLY-GRADED SANDS, OR GRAVELLY SANDS, <5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS
		DIRTY SANDS	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW 'A' LINE OR $I_p < 4$
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE 'A' LINE OR $I_p > 7$
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO. 200 SIEVE SIZE)	SILTS		ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
	BELOW 'A' LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	CLAYS		CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
	ABOVE 'A' LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY SILTY CLAYS	$W_L > 30, < 50$
			CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS & ORGANIC CLAYS		OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
	BELOW 'A' LINE ON PLASTICITY CHART		OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$
							SEE CHART BELOW



- All sieve sizes mentioned on this chart are U.S. Standard, ASTM E11.
- Boundary classifications possessing characteristics of two groups are given combined group symbols eg GW-GC is a well-graded gravel-sand mixture with clay binder between 5% and 12%.
- Soil fractions and limiting textural boundaries are in accordance with the Unified Soil Classification System, except that an inorganic clay of medium plasticity (CI) is recognized.
- The following adjectives may be employed to define percentage ranges by weight of minor components:

and	50 - 36%
gravelly, sandy, silty, clayey, ect.	35 - 21%
some	20 - 11%
trace	10 - 1%

PLASTICITY CHART



Englobe



TEST PIT LOG

PROJECT

Test Pit Investigation
Berry Hills 8 (Portion of PID No. 41071069), Middle Sackville, NS

LOGGED/DWN. RH		CKD. RP		DATE OF INVEST. 5/16/19		JOB 1900384-00-5		TEST PIT HS2	
		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC %	wp- □ w- ● wl- △				DATUM	Ground Surface	COND.	TYPE	POCKET PENE.
10	20 30 40 50								OTHER TESTS
					Organic.		GRAB		
		1			TILL: Silty sand, some clay, occasional cobbles and boulders, moist to wet, brown.		GRAB		
		2							
					End of test pit at 0.7 m in till.				
		3			Groundwater not encountered.				
		4							
		5							
		6							
		7							
		8							
		9							
		10							
		11							
		12							
		13							
		14							
		15							
		16							
		5							



TEST PIT LOG

PROJECT

Test Pit Investigation

Berry Hills 8 (Portion of PID No. 41071069), Middle Sackville, NS

LOGGED/DWN. RH

CKD. RP

DATE OF INVEST. 5/16/19

JOB 1900384-00-5

TEST PIT HS3

DEPTH		MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE			BACKHOE TYPE
ft	m			DATUM	Ground Surface	COND.	TYPE	POCKET PENE.	Shovel
				SURFACE ELEVATION		OTHER TESTS			
				Surge rock and organic matter.		GRAB			Soil-HS1 (0-0.3m): TPH/BTEX, PAH, metals
1		[Cross-hatched symbol]		FILL: Silty sand, some clay, occasional cobbles and boulders, moist, brown.		GRAB			
2						End of test pit at 0.63 metres in fill.			
3				Groundwater not encountered.					
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
5									



TEST PIT LOG

PROJECT

Test Pit Investigation

Berry Hills 8 (Portion of PID No. 41071069), Middle Sackville, NS

LOGGED/DWN. RH		CKD. RP		DATE OF INVEST. 5/15/19		JOB 1900384-00-5		TEST PIT TP1	
		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC % wp- □ w- ● wl- △ 10 20 30 40 50					DATUM	Ground Surface		COND.	TYPE
				SURFACE ELEVATION				OTHER TESTS	
		1		Organic.	FILL: Silty sand, some gravel and clay, occasional cobbles and boulders, moist to wet, brown.		GRAB		Soil-TP1 (0-1m): TPH/BTEX, PAH, metals Soil-TP1 (1-2m): TPH, PAH, metals
		2							
		3							
		4							
		5					GRAB		
		6							
		7							
		8		End of test pit at 2.1 m in till.					
		9		Perched groundwater encountered at 1.5 m.					
		10							
		11							
		12							
		13							
		14							
		15							
		16							
		5							

Appendix C: Analytical Results

TABLE 1: TOTAL PETROLEUM HYDROCARBON (TPH) COMPOUNDS in Soil

Client: Armco Capital Inc.

Site Location: Portion of PID No. 41071069, Middle Sackville, NS

Englobe Project No.: 1900384-00-0

Parameter	Units	NSE Tier 1 EQS (Non-Potable) ¹	NSE Tier 1 EQS (Potable) ²	Sample ID (Sample Depth) Date Sampled				
				TP1 (0.0-1.0M)	TP1 (1.0-2.0M)	HS1 (0.0-0.3M)	HS3 (0.0-0.3M)	
				(0.0 - 1.0 m) 15-May-19	(1.0 - 2.0 m) 15-May-19	(0.0 - 0.3 m) 16-May-19	(0.0 - 0.3 m) 16-May-19	
BTEX	Benzene	mg/kg	0.099	0.042	<0.025	<0.025	<0.025	<0.025
	Toluene	mg/kg	77	0.35	<0.050	<0.050	<0.050	<0.050
	Ethylbenzene	mg/kg	30	0.065	<0.025	<0.025	<0.025	<0.025
	Xylenes	mg/kg	8.8	8.8	<0.050	<0.050	<0.050	<0.050
Modified TPH	Gas Range (C₆-C₁₀)	mg/kg	-	-	<2.5	<2.5	<2.5	<2.5
	Fuel Range (C₁₀-C₁₆)	mg/kg	-	-	<10	<10	<10	<10
	Fuel Range (C₁₆-C₂₁)	mg/kg	-	-	<10	<10	<10	<10
	Lube Range (C₂₁-C₃₂)	mg/kg	-	-	<15	<15	<15	<15
Total Modified TPH - Tier 1	mg/kg	74 as gas 270 as fuel oil 1,100 as lube oil	74 as gas 270 as fuel oil 1,100 as lube oil	<15	<15	<15	<15	
Product Resemblance	-	-	-	-	-	-	-	

Notes:

value
value

- value exceeds NSE Tier 1 EQS (non-potable) applicable to the site

- value exceeds NSE Tier 1 EQS (potable) applicable to surrounding properties north of the municipal service boundary

¹ 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with potable groundwater and coarse-grained soil.

² 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with non-potable groundwater and coarse-grained soil.

TABLE 2: METALS in Soil

Client: Armco Capital Inc.

Site Location: Portion of PID No. 41071069, Middle Sackville, NS

Englobe Project No.: 1900384-00-0

Parameter	Units	NSE Tier 1 EQS (Non-Potable) ¹	NSE Tier 1 EQS (Potable) ²	Sample ID (Sample Depth) Date Sampled			
				TP1 (0.0-1.0M)	TP1 (1.0-2.0M)	HS1 (0.0-0.3M)	HS3 (0.0-0.3M)
				(0.0 - 1.0 m) 15-May-19	(1.0 - 2.0 m) 15-May-19	(0.0 - 0.3 m) 16-May-19	(0.0 - 0.3 m) 16-May-19
Aluminum (Al)	mg/kg	15,400	15,400	16,000	13,000	9,700	14,000
Antimony (Sb)	mg/kg	7.5	7.5	<2.0	<2.0	<2.0	<2.0
Arsenic (As)	mg/kg	31	31	11	10	6.6	10
Barium (Ba)	mg/kg	10,000	10,000	91	82	53	87
Beryllium (Be)	mg/kg	38	38	<2.0	<2.0	<2.0	<2.0
Bismuth (Bi)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0
Boron (B)	mg/kg	4,300	4,300	<50	<50	<50	<50
Cadmium (Cd)	mg/kg	14	14	<0.30	<0.30	<0.30	<0.30
Chromium (Cr)	mg/kg	220	220	24	21	15	23
Cobalt (Co)	mg/kg	22	22	20	13	9.3	17
Copper (Cu)	mg/kg	1,100	1,100	30	24	16	27
Iron (Fe)	mg/kg	11,000	11,000	31,000	28,000	21,000	29,000
Lead (Pb)	mg/kg	140	140	14	11	8.6	12
Lithium (Li)	mg/kg	-	-	29	24	21	26
Manganese (Mn)	mg/kg	-	-	830	760	620	830
Mercury (Hg)	mg/kg	6.6	6.6	<0.10	<0.10	<0.10	<0.10
Molybdenum (Mo)	mg/kg	110	110	<2.0	<2.0	<2.0	<2.0
Nickel (Ni)	mg/kg	330	330	34	26	21	29
Rubidium (Rb)	mg/kg	-	-	16	14	9.2	17
Selenium (Se)	mg/kg	80	80	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	mg/kg	77	77	<0.50	<0.50	<0.50	<0.50
Strontium (Sr)	mg/kg	9,400	9,400	11	8.9	11	9.6
Thallium (Tl)	mg/kg	1	1	0.14	0.13	<0.10	0.13
Tin (Sn)	mg/kg	9,400	9,400	<1.0	<1.0	<1.0	<1.0
Uranium (U)	mg/kg	23	23	0.97	0.92	0.71	0.87
Vanadium (V)	mg/kg	39	39	25	23	17	23
Zinc (Zn)	mg/kg	5,600	5,600	76	53	42	66

Notes:

- value** - value exceeds NSE Tier 1 EQS (non-potable) applicable to the site
- value** - value exceeds NSE Tier 1 EQS (potable) applicable to surrounding properties north of the municipal service boundary

¹ 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with potable groundwater and coarse-grained soil.

² 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with non-potable groundwater and coarse-grained soil.

TABLE 3: PAH in Soil

Client: Armco Capital Inc.

Site Location: Portion of PID No. 41071069, Middle Sackville, NS

Englobe Project No.: 1900384-00-0

Parameter	Units	NSE Tier 1 EQS (Non-Potable) ¹	NSE Tier 1 EQS (Potable) ²	Sample ID (Sample Depth) Date Sampled				
				TP1 (0.0-1.0M) (0.0 - 1.0 m) 15-May-19	TP1 (0.0-1.0M) Lab Duplicate	TP1 (1.0-2.0M) (1.0 - 2.0 m) 15-May-19	HS1 (0.0-0.3M) (0.0 - 0.3 m) 16-May-19	HS3 (0.0-0.3M) (0.0 - 0.3 m) 16-May-19
				1-Methylnaphthalene	mg/kg	72	30	<0.010
2-Methylnaphthalene	mg/kg	72	30	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg	3,900	3,900	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg	4.5	4.5	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg	24,000	24,000	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b/j)fluoranthene	mg/kg	-	-	<0.020	-	<0.020	<0.020	<0.020
Benzo(g,h,i)perylene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(j)fluoranthene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	mg/kg	-	-	<0.020	<0.020	<0.020	<0.020	<0.020
Chrysene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenzo(a,h)anthracene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg	3,500	3,500	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	mg/kg	2,700	2,700	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg	2.2	2.2	<0.010	<0.010	<0.010	<0.010	<0.010
Perylene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg	2,100	2,100	<0.010	<0.010	<0.010	<0.010	<0.010
BaP Total Potency Equivalent ²	mg/kg	5.3	5.3	0.012	-	0.012	0.012	0.012

Notes:

value - value exceeds NSE Tier 1 EQS (non-potable) applicable to the site

value - value exceeds NSE Tier 1 EQS (potable) applicable to surrounding properties north of the municipal service boundary

¹ 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with potable groundwater and coarse-grained soil.

² 2013 Nova Scotia Environment (NSE) Tier 1 Environmental Quality Standards (EQS) for a residential property with non-potable groundwater and coarse-grained soil.

³ The Benzo(a)Pyrene Total Potency Equivalent [B(a)P TPE] for a soil sample is calculated by multiplying the concentration of each carcinogenic PAH in the sample (or 1/2 its detection limit when concentration is non-detect) by its corresponding B(a)P Potency Equivalence Factor, and summing these products.

Appendix D:

**Laboratory Certificate
of Analysis**

Your P.O. #: 25233
 Your Project #: 01900384-00-0
 Site Location: BERRY HILLS
 Your C.O.C. #: D38556

Attention: Ryan Pellerin

Englobe Corp
 97 Troop Ave
 Dartmouth, NS
 CANADA B3B 2A7

Report Date: 2019/05/28
 Report #: R5727758
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9D4494
Received: 2019/05/17, 11:23

Sample Matrix: Soil
 # Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Benzo(b/j)fluoranthene Sum (soil)	4	N/A	2019/05/24	N/A	Auto Calc.
TEH in Soil (PIRI) (1)	4	2019/05/22	2019/05/23	ATL SOP 00111	Atl. RBCA v3.1 m
Metals Solids Acid Extr. ICPMS	4	2019/05/24	2019/05/24	ATL SOP 00058	EPA 6020B R2 m
Moisture	4	N/A	2019/05/23	ATL SOP 00001	OMOE Handbook 1983 m
PAH Compounds by GCMS (SIM) (1)	4	2019/05/23	2019/05/23	ATL SOP 00102	EPA 8270E R6 m
ModTPH (T1) Calc. for Soil	4	N/A	2019/05/24	N/A	Atl. RBCA v3.1 m
VPH in Soil (PIRI) - Field Preserved (2)	4	N/A	2019/05/24	ATL SOP 00119	Atl. RBCA v3.1 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) No lab extraction date is given for C6-C10/BTEX and VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

Your P.O. #: 25233
Your Project #: 01900384-00-0
Site Location: BERRY HILLS
Your C.O.C. #: D38556

Attention: Ryan Pellerin

Englobe Corp
97 Troop Ave
Dartmouth, NS
CANADA B3B 2A7

Report Date: 2019/05/28
Report #: R5727758
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9D4494
Received: 2019/05/17, 11:23

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Keri Mackay, Customer Experience Team Lead
Email: kmackay@maxxam.ca
Phone# (902)420-0203 Ext:294

=====
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RBCA HYDROCARBONS IN SOIL (FIELD PRES.)

Maxxam ID		JTM354	JTM355	JTM356	JTM357		
Sampling Date		2019/05/15 10:47	2019/05/15 10:55	2019/05/16 09:25	2019/05/16 10:09		
COC Number		D38556	D38556	D38556	D38556		
	UNITS	TP1 (0.0-1.0M)	TP1 (1.0-2.0M)	HS1 (0.0-0.3M)	HS3 (0.0-0.3M)	RDL	QC Batch
Inorganics							
Moisture	%	15	15	17	11	1.0	6133029
Petroleum Hydrocarbons							
Benzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	6136195
Toluene	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	6136195
Ethylbenzene	mg/kg	<0.025	<0.025	<0.025	<0.025	0.025	6136195
Total Xylenes	mg/kg	<0.050	<0.050	<0.050	<0.050	0.050	6136195
C6 - C10 (less BTEX)	mg/kg	<2.5	<2.5	<2.5	<2.5	2.5	6136195
>C10-C16 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	6133496
>C16-C21 Hydrocarbons	mg/kg	<10	<10	<10	<10	10	6133496
>C21-<C32 Hydrocarbons	mg/kg	<15	<15	<15	<15	15	6133496
Modified TPH (Tier1)	mg/kg	<15	<15	<15	<15	15	6130935
Reached Baseline at C32	mg/kg	NA	NA	NA	NA	N/A	6133496
Hydrocarbon Resemblance	mg/kg	NA	NA	NA	NA	N/A	6133496
Surrogate Recovery (%)							
Isobutylbenzene - Extractable	%	98	100	101	99		6133496
n-Dotriacontane - Extractable	%	115 (1)	118	118	114		6133496
Isobutylbenzene - Volatile	%	94	126 (2)	92	93 (2)		6136195
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Silica gel clean-up performed prior to analysis as per client request. TEH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility. (2) VPH samples were extracted using a flat-bed shaker instead of the accelerated mechanical shaker due to matrix incompatibility.							

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		JTM354	JTM355	JTM356	JTM357		
Sampling Date		2019/05/15 10:47	2019/05/15 10:55	2019/05/16 09:25	2019/05/16 10:09		
COC Number		D38556	D38556	D38556	D38556		
	UNITS	TP1 (0.0-1.0M)	TP1 (1.0-2.0M)	HS1 (0.0-0.3M)	HS3 (0.0-0.3M)	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	16000	13000	9700	14000	10	6138081
Acid Extractable Antimony (Sb)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6138081
Acid Extractable Arsenic (As)	mg/kg	11	10	6.6	10	2.0	6138081
Acid Extractable Barium (Ba)	mg/kg	91	82	53	87	5.0	6138081
Acid Extractable Beryllium (Be)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6138081
Acid Extractable Bismuth (Bi)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6138081
Acid Extractable Boron (B)	mg/kg	<50	<50	<50	<50	50	6138081
Acid Extractable Cadmium (Cd)	mg/kg	<0.30	<0.30	<0.30	<0.30	0.30	6138081
Acid Extractable Chromium (Cr)	mg/kg	24	21	15	23	2.0	6138081
Acid Extractable Cobalt (Co)	mg/kg	20	13	9.3	17	1.0	6138081
Acid Extractable Copper (Cu)	mg/kg	30	24	16	27	2.0	6138081
Acid Extractable Iron (Fe)	mg/kg	31000	28000	21000	29000	50	6138081
Acid Extractable Lead (Pb)	mg/kg	14	11	8.6	12	0.50	6138081
Acid Extractable Lithium (Li)	mg/kg	29	24	21	26	2.0	6138081
Acid Extractable Manganese (Mn)	mg/kg	830	760	620	830	2.0	6138081
Acid Extractable Mercury (Hg)	mg/kg	<0.10	<0.10	<0.10	<0.10	0.10	6138081
Acid Extractable Molybdenum (Mo)	mg/kg	<2.0	<2.0	<2.0	<2.0	2.0	6138081
Acid Extractable Nickel (Ni)	mg/kg	34	26	21	29	2.0	6138081
Acid Extractable Rubidium (Rb)	mg/kg	16	14	9.2	17	2.0	6138081
Acid Extractable Selenium (Se)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	6138081
Acid Extractable Silver (Ag)	mg/kg	<0.50	<0.50	<0.50	<0.50	0.50	6138081
Acid Extractable Strontium (Sr)	mg/kg	11	8.9	11	9.6	5.0	6138081
Acid Extractable Thallium (Tl)	mg/kg	0.14	0.13	<0.10	0.13	0.10	6138081
Acid Extractable Tin (Sn)	mg/kg	<1.0	<1.0	<1.0	<1.0	1.0	6138081
Acid Extractable Uranium (U)	mg/kg	0.97	0.92	0.71	0.87	0.10	6138081
Acid Extractable Vanadium (V)	mg/kg	25	23	17	23	2.0	6138081
Acid Extractable Zinc (Zn)	mg/kg	76	53	42	66	5.0	6138081
RDL = Reportable Detection Limit							
QC Batch = Quality Control Batch							

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		JTM354			JTM354			JTM355		
Sampling Date		2019/05/15 10:47			2019/05/15 10:47			2019/05/15 10:55		
COC Number		D38556			D38556			D38556		
	UNITS	TP1 (0.0-1.0M)	RDL	QC Batch	TP1 (0.0-1.0M) Lab-Dup	RDL	QC Batch	TP1 (1.0-2.0M)	RDL	QC Batch

Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
2-Methylnaphthalene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Acenaphthene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Acenaphthylene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Anthracene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(a)anthracene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(a)pyrene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(b)fluoranthene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(b/j)fluoranthene	mg/kg	<0.020	0.020	6130931				<0.020	0.020	6130931
Benzo(g,h,i)perylene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(j)fluoranthene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Benzo(k)fluoranthene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Chrysene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Dibenz(a,h)anthracene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Fluoranthene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Fluorene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Naphthalene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Perylene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Phenanthrene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Pyrene	mg/kg	<0.010	0.010	6135748	<0.010	0.010	6135748	<0.010	0.010	6135748
Surrogate Recovery (%)										
D10-Anthracene	%	106		6135748	98		6135748	100		6135748
D14-Terphenyl (FS)	%	104		6135748	99		6135748	98		6135748
D8-Acenaphthylene	%	101		6135748	96		6135748	94		6135748

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID		JTM356	JTM357		
Sampling Date		2019/05/16 09:25	2019/05/16 10:09		
COC Number		D38556	D38556		
	UNITS	HS1 (0.0-0.3M)	HS3 (0.0-0.3M)	RDL	QC Batch

Polyaromatic Hydrocarbons					
1-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	6135748
2-Methylnaphthalene	mg/kg	<0.010	<0.010	0.010	6135748
Acenaphthene	mg/kg	<0.010	<0.010	0.010	6135748
Acenaphthylene	mg/kg	<0.010	<0.010	0.010	6135748
Anthracene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(a)anthracene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(a)pyrene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(b)fluoranthene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(b/j)fluoranthene	mg/kg	<0.020	<0.020	0.020	6130931
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(j)fluoranthene	mg/kg	<0.010	<0.010	0.010	6135748
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	0.010	6135748
Chrysene	mg/kg	<0.010	<0.010	0.010	6135748
Dibenz(a,h)anthracene	mg/kg	<0.010	<0.010	0.010	6135748
Fluoranthene	mg/kg	<0.010	<0.010	0.010	6135748
Fluorene	mg/kg	<0.010	<0.010	0.010	6135748
Indeno(1,2,3-cd)pyrene	mg/kg	<0.010	<0.010	0.010	6135748
Naphthalene	mg/kg	<0.010	<0.010	0.010	6135748
Perylene	mg/kg	<0.010	<0.010	0.010	6135748
Phenanthrene	mg/kg	<0.010	<0.010	0.010	6135748
Pyrene	mg/kg	<0.010	<0.010	0.010	6135748
Surrogate Recovery (%)					
D10-Anthracene	%	105	107		6135748
D14-Terphenyl (FS)	%	104	107		6135748
D8-Acenaphthylene	%	96	101		6135748
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	-1.0°C
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Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
	6133029	SDN	RPD	Moisture	2019/05/23	1.3		%	25
	6133496	BCD	Matrix Spike	Isobutylbenzene - Extractable	2019/05/23		106	%	60 - 130
				n-Dotriacontane - Extractable	2019/05/23		118	%	60 - 130
				>C10-C16 Hydrocarbons	2019/05/23		102	%	30 - 130
				>C16-C21 Hydrocarbons	2019/05/23		97	%	30 - 130
				>C21-<C32 Hydrocarbons	2019/05/23		NC	%	30 - 130
	6133496	BCD	Spiked Blank	Isobutylbenzene - Extractable	2019/05/23		99	%	60 - 130
				n-Dotriacontane - Extractable	2019/05/23		105	%	60 - 130
				>C10-C16 Hydrocarbons	2019/05/23		103	%	60 - 130
				>C16-C21 Hydrocarbons	2019/05/23		100	%	60 - 130
				>C21-<C32 Hydrocarbons	2019/05/23		113	%	60 - 130
	6133496	BCD	Method Blank	Isobutylbenzene - Extractable	2019/05/22		98	%	60 - 130
				n-Dotriacontane - Extractable	2019/05/22		102	%	60 - 130
				>C10-C16 Hydrocarbons	2019/05/22	<10		mg/kg	
				>C16-C21 Hydrocarbons	2019/05/22	<10		mg/kg	
				>C21-<C32 Hydrocarbons	2019/05/22	<15		mg/kg	
	6133496	BCD	RPD	>C10-C16 Hydrocarbons	2019/05/23	31		%	50
				>C16-C21 Hydrocarbons	2019/05/23	34		%	50
				>C21-<C32 Hydrocarbons	2019/05/23	29		%	50
	6135748	LGE	Matrix Spike [JTM354-01]	D10-Anthracene	2019/05/23		102	%	50 - 130
				D14-Terphenyl (FS)	2019/05/23		100	%	50 - 130
				D8-Acenaphthylene	2019/05/23		96	%	50 - 130
				1-Methylnaphthalene	2019/05/23		91	%	50 - 130
				2-Methylnaphthalene	2019/05/23		91	%	50 - 130
				Acenaphthene	2019/05/23		96	%	50 - 130
				Acenaphthylene	2019/05/23		96	%	50 - 130
				Anthracene	2019/05/23		99	%	50 - 130
				Benzo(a)anthracene	2019/05/23		97	%	50 - 130
				Benzo(a)pyrene	2019/05/23		95	%	50 - 130
				Benzo(b)fluoranthene	2019/05/23		99	%	50 - 130
				Benzo(g,h,i)perylene	2019/05/23		91	%	50 - 130
				Benzo(j)fluoranthene	2019/05/23		96	%	50 - 130
				Benzo(k)fluoranthene	2019/05/23		99	%	50 - 130
				Chrysene	2019/05/23		105	%	50 - 130
				Dibenz(a,h)anthracene	2019/05/23		96	%	50 - 130
				Fluoranthene	2019/05/23		97	%	50 - 130
				Fluorene	2019/05/23		98	%	50 - 130
				Indeno(1,2,3-cd)pyrene	2019/05/23		92	%	50 - 130
				Naphthalene	2019/05/23		96	%	50 - 130
				Perylene	2019/05/23		93	%	50 - 130
				Phenanthrene	2019/05/23		101	%	50 - 130
				Pyrene	2019/05/23		99	%	50 - 130
	6135748	LGE	Spiked Blank	D10-Anthracene	2019/05/23		113	%	50 - 130
				D14-Terphenyl (FS)	2019/05/23		107	%	50 - 130
				D8-Acenaphthylene	2019/05/23		106	%	50 - 130
				1-Methylnaphthalene	2019/05/23		97	%	50 - 130
				2-Methylnaphthalene	2019/05/23		98	%	50 - 130
				Acenaphthene	2019/05/23		103	%	50 - 130
				Acenaphthylene	2019/05/23		103	%	50 - 130
				Anthracene	2019/05/23		107	%	50 - 130
				Benzo(a)anthracene	2019/05/23		106	%	50 - 130
				Benzo(a)pyrene	2019/05/23		99	%	50 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(b)fluoranthene	2019/05/23		103	%	50 - 130
			Benzo(g,h,i)perylene	2019/05/23		96	%	50 - 130
			Benzo(j)fluoranthene	2019/05/23		103	%	50 - 130
			Benzo(k)fluoranthene	2019/05/23		112	%	50 - 130
			Chrysene	2019/05/23		115	%	50 - 130
			Dibenz(a,h)anthracene	2019/05/23		100	%	50 - 130
			Fluoranthene	2019/05/23		105	%	50 - 130
			Fluorene	2019/05/23		104	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/05/23		97	%	50 - 130
			Naphthalene	2019/05/23		102	%	50 - 130
			Perylene	2019/05/23		100	%	50 - 130
			Phenanthrene	2019/05/23		110	%	50 - 130
			Pyrene	2019/05/23		108	%	50 - 130
6135748	LGE	Method Blank	D10-Anthracene	2019/05/23		112	%	50 - 130
			D14-Terphenyl (FS)	2019/05/23		106	%	50 - 130
			D8-Acenaphthylene	2019/05/23		101	%	50 - 130
			1-Methylnaphthalene	2019/05/23	<0.010		mg/kg	
			2-Methylnaphthalene	2019/05/23	<0.010		mg/kg	
			Acenaphthene	2019/05/23	<0.010		mg/kg	
			Acenaphthylene	2019/05/23	<0.010		mg/kg	
			Anthracene	2019/05/23	<0.010		mg/kg	
			Benzo(a)anthracene	2019/05/23	<0.010		mg/kg	
			Benzo(a)pyrene	2019/05/23	<0.010		mg/kg	
			Benzo(b)fluoranthene	2019/05/23	<0.010		mg/kg	
			Benzo(g,h,i)perylene	2019/05/23	<0.010		mg/kg	
			Benzo(j)fluoranthene	2019/05/23	<0.010		mg/kg	
			Benzo(k)fluoranthene	2019/05/23	<0.010		mg/kg	
			Chrysene	2019/05/23	<0.010		mg/kg	
			Dibenz(a,h)anthracene	2019/05/23	<0.010		mg/kg	
			Fluoranthene	2019/05/23	<0.010		mg/kg	
			Fluorene	2019/05/23	<0.010		mg/kg	
			Indeno(1,2,3-cd)pyrene	2019/05/23	<0.010		mg/kg	
			Naphthalene	2019/05/23	<0.010		mg/kg	
			Perylene	2019/05/23	<0.010		mg/kg	
			Phenanthrene	2019/05/23	<0.010		mg/kg	
			Pyrene	2019/05/23	<0.010		mg/kg	
6135748	LGE	RPD [JTM354-01]	1-Methylnaphthalene	2019/05/23	NC		%	50
			2-Methylnaphthalene	2019/05/23	NC		%	50
			Acenaphthene	2019/05/23	NC		%	50
			Acenaphthylene	2019/05/23	NC		%	50
			Anthracene	2019/05/23	NC		%	50
			Benzo(a)anthracene	2019/05/23	NC		%	50
			Benzo(a)pyrene	2019/05/23	NC		%	50
			Benzo(b)fluoranthene	2019/05/23	NC		%	50
			Benzo(g,h,i)perylene	2019/05/23	NC		%	50
			Benzo(j)fluoranthene	2019/05/23	NC		%	50
			Benzo(k)fluoranthene	2019/05/23	NC		%	50
			Chrysene	2019/05/23	NC		%	50
			Dibenz(a,h)anthracene	2019/05/23	NC		%	50
			Fluoranthene	2019/05/23	NC		%	50
			Fluorene	2019/05/23	NC		%	50
			Indeno(1,2,3-cd)pyrene	2019/05/23	NC		%	50

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6136195	SHL	Matrix Spike	Naphthalene	2019/05/23	NC		%	50
			Perylene	2019/05/23	NC		%	50
			Phenanthrene	2019/05/23	NC		%	50
			Pyrene	2019/05/23	NC		%	50
			Isobutylbenzene - Volatile	2019/05/23		97	%	60 - 130
			Benzene	2019/05/23		106	%	60 - 130
			Toluene	2019/05/23		108	%	60 - 130
			Ethylbenzene	2019/05/23		109	%	60 - 130
6136195	SHL	Spiked Blank	Total Xylenes	2019/05/23		104	%	60 - 130
			Isobutylbenzene - Volatile	2019/05/23		91	%	60 - 130
			Benzene	2019/05/23		100	%	60 - 140
			Toluene	2019/05/23		102	%	60 - 140
			Ethylbenzene	2019/05/23		99	%	60 - 140
6136195	SHL	Method Blank	Total Xylenes	2019/05/23		95	%	60 - 140
			Isobutylbenzene - Volatile	2019/05/23		94	%	60 - 130
			Benzene	2019/05/23	<0.025		mg/kg	
			Toluene	2019/05/23	<0.050		mg/kg	
			Ethylbenzene	2019/05/23	<0.025		mg/kg	
6136195	SHL	RPD	Total Xylenes	2019/05/23	<0.050		mg/kg	
			C6 - C10 (less BTEX)	2019/05/23	<2.5		mg/kg	
			Benzene	2019/05/23	NC		%	50
			Toluene	2019/05/23	NC		%	50
			Ethylbenzene	2019/05/23	NC		%	50
6138081	BAN	Matrix Spike	Total Xylenes	2019/05/23	NC		%	50
			C6 - C10 (less BTEX)	2019/05/23	NC		%	50
			Acid Extractable Antimony (Sb)	2019/05/24		98	%	75 - 125
			Acid Extractable Arsenic (As)	2019/05/24		100	%	75 - 125
			Acid Extractable Barium (Ba)	2019/05/24		101	%	75 - 125
			Acid Extractable Beryllium (Be)	2019/05/24		103	%	75 - 125
			Acid Extractable Bismuth (Bi)	2019/05/24		101	%	75 - 125
			Acid Extractable Boron (B)	2019/05/24		98	%	75 - 125
			Acid Extractable Cadmium (Cd)	2019/05/24		99	%	75 - 125
			Acid Extractable Chromium (Cr)	2019/05/24		113	%	75 - 125
			Acid Extractable Cobalt (Co)	2019/05/24		102	%	75 - 125
			Acid Extractable Copper (Cu)	2019/05/24		100	%	75 - 125
			Acid Extractable Lead (Pb)	2019/05/24		94	%	75 - 125
			Acid Extractable Lithium (Li)	2019/05/24		107	%	75 - 125
			Acid Extractable Manganese (Mn)	2019/05/24		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2019/05/24		95	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2019/05/24		109	%	75 - 125
			Acid Extractable Nickel (Ni)	2019/05/24		105	%	75 - 125
			Acid Extractable Rubidium (Rb)	2019/05/24		101	%	75 - 125
			Acid Extractable Selenium (Se)	2019/05/24		104	%	75 - 125
Acid Extractable Silver (Ag)	2019/05/24		102	%	75 - 125			
Acid Extractable Strontium (Sr)	2019/05/24		79	%	75 - 125			
Acid Extractable Thallium (Tl)	2019/05/24		103	%	75 - 125			
Acid Extractable Tin (Sn)	2019/05/24		106	%	75 - 125			
Acid Extractable Uranium (U)	2019/05/24		107	%	75 - 125			
Acid Extractable Vanadium (V)	2019/05/24		99	%	75 - 125			
Acid Extractable Zinc (Zn)	2019/05/24		104	%	75 - 125			
6138081	BAN	Spiked Blank	Acid Extractable Antimony (Sb)	2019/05/24		107	%	75 - 125
			Acid Extractable Arsenic (As)	2019/05/24		102	%	75 - 125

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Barium (Ba)	2019/05/24		102	%	75 - 125
			Acid Extractable Beryllium (Be)	2019/05/24		102	%	75 - 125
			Acid Extractable Bismuth (Bi)	2019/05/24		103	%	75 - 125
			Acid Extractable Boron (B)	2019/05/24		101	%	75 - 125
			Acid Extractable Cadmium (Cd)	2019/05/24		99	%	75 - 125
			Acid Extractable Chromium (Cr)	2019/05/24		103	%	75 - 125
			Acid Extractable Cobalt (Co)	2019/05/24		102	%	75 - 125
			Acid Extractable Copper (Cu)	2019/05/24		100	%	75 - 125
			Acid Extractable Lead (Pb)	2019/05/24		100	%	75 - 125
			Acid Extractable Lithium (Li)	2019/05/24		102	%	75 - 125
			Acid Extractable Manganese (Mn)	2019/05/24		101	%	75 - 125
			Acid Extractable Mercury (Hg)	2019/05/24		106	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2019/05/24		103	%	75 - 125
			Acid Extractable Nickel (Ni)	2019/05/24		102	%	75 - 125
			Acid Extractable Rubidium (Rb)	2019/05/24		103	%	75 - 125
			Acid Extractable Selenium (Se)	2019/05/24		103	%	75 - 125
			Acid Extractable Silver (Ag)	2019/05/24		101	%	75 - 125
			Acid Extractable Strontium (Sr)	2019/05/24		102	%	75 - 125
			Acid Extractable Thallium (Tl)	2019/05/24		101	%	75 - 125
			Acid Extractable Tin (Sn)	2019/05/24		103	%	75 - 125
			Acid Extractable Uranium (U)	2019/05/24		106	%	75 - 125
			Acid Extractable Vanadium (V)	2019/05/24		102	%	75 - 125
			Acid Extractable Zinc (Zn)	2019/05/24		104	%	75 - 125
6138081	BAN	Method Blank	Acid Extractable Aluminum (Al)	2019/05/24	<10		mg/kg	
			Acid Extractable Antimony (Sb)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Arsenic (As)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Barium (Ba)	2019/05/24	<5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Boron (B)	2019/05/24	<50		mg/kg	
			Acid Extractable Cadmium (Cd)	2019/05/24	<0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2019/05/24	<1.0		mg/kg	
			Acid Extractable Copper (Cu)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Iron (Fe)	2019/05/24	<50		mg/kg	
			Acid Extractable Lead (Pb)	2019/05/24	<0.50		mg/kg	
			Acid Extractable Lithium (Li)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2019/05/24	<0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Selenium (Se)	2019/05/24	<1.0		mg/kg	
			Acid Extractable Silver (Ag)	2019/05/24	<0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2019/05/24	<5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2019/05/24	<0.10		mg/kg	
			Acid Extractable Tin (Sn)	2019/05/24	<1.0		mg/kg	
			Acid Extractable Uranium (U)	2019/05/24	<0.10		mg/kg	
			Acid Extractable Vanadium (V)	2019/05/24	<2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2019/05/24	<5.0		mg/kg	
6138081	BAN	RPD	Acid Extractable Aluminum (Al)	2019/05/24	19		%	35
			Acid Extractable Antimony (Sb)	2019/05/24	NC		%	35

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Arsenic (As)	2019/05/24	4.1		%	35
			Acid Extractable Beryllium (Be)	2019/05/24	NC		%	35
			Acid Extractable Bismuth (Bi)	2019/05/24	NC		%	35
			Acid Extractable Boron (B)	2019/05/24	NC		%	35
			Acid Extractable Cadmium (Cd)	2019/05/24	NC		%	35
			Acid Extractable Chromium (Cr)	2019/05/24	27		%	35
			Acid Extractable Cobalt (Co)	2019/05/24	31		%	35
			Acid Extractable Copper (Cu)	2019/05/24	11		%	35
			Acid Extractable Iron (Fe)	2019/05/24	9.8		%	35
			Acid Extractable Lithium (Li)	2019/05/24	19		%	35
			Acid Extractable Manganese (Mn)	2019/05/24	25		%	35
			Acid Extractable Mercury (Hg)	2019/05/24	NC		%	35
			Acid Extractable Molybdenum (Mo)	2019/05/24	NC		%	35
			Acid Extractable Nickel (Ni)	2019/05/24	24		%	35
			Acid Extractable Rubidium (Rb)	2019/05/24	3.0		%	35
			Acid Extractable Selenium (Se)	2019/05/24	NC		%	35
			Acid Extractable Silver (Ag)	2019/05/24	NC		%	35
			Acid Extractable Thallium (Tl)	2019/05/24	NC		%	35
			Acid Extractable Tin (Sn)	2019/05/24	NC		%	35
			Acid Extractable Vanadium (V)	2019/05/24	5.0		%	35
			Acid Extractable Zinc (Zn)	2019/05/24	11		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Alan Stewart, Organics Manager, Bedford



Mike MacGillivray, Scientific Specialist (Inorganics)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

