



**V.A. WOOD (GUELPH) INCORPORATED**  
CONSULTING GEOTECHNICAL ENGINEERS

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*PRELIMINARY GEOTECHNICAL INVESTIGATION  
PROPOSED APARTMENT BUILDING  
1871 & 1879 GORDON STREET  
GUELPH, ONTARIO*

*Ref. No. G4091-19-4  
April, 2019*

***Amended  
June 5, 2019***

*Prepared for:*

*Mar-Cot Developments Inc.  
375 Southgate Drive  
Guelph, Ontario  
N1G 3W6*

*Attention: Mr. Mario Cotroneo*

*Distribution:*

- (1) Copy – Mar-Cot Developments Inc.*
- (1) Copy – GM BluePlan Engineering Ltd.*
- (2) Copies – V.A. Wood (Guelph) Inc.*



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**1.0 INTRODUCTION:**

*V.A. Wood (Guelph) Inc. was retained by Mar-Cot Developments Inc. to carry out a preliminary geotechnical investigation for the proposed apartment building to be constructed at 1871 and 1879 in Guelph, Ontario.*

*Detailed plans for the proposed development were not available at the time of this report but it is understood that the preliminary plans are for a four-storey apartment building with two levels of underground parking as well as surface parking.*

*It is noted that the subject properties are currently occupied with two detached residential dwellings.*

*The purpose of the investigation was to reveal the subsurface conditions and to determine the relevant soil properties for preliminary recommendations for the design and construction of building foundations, retaining walls, storm water management and pavement designs.*

**2.0 FIELD WORK:**

*The fieldwork was carried out over the period of March 12 to 14, 2019 and consisted of seven (7) boreholes at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a track-mounted, power auger machine, equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Logs as N-values. The subsurface soils were visually inspected, logged and sampled at the borehole locations.*

*Engineering staff from our office supervised the fieldwork with personnel from GM BluePlan Engineering Ltd. and the ground elevation at each borehole was supplied by GM BluePlan Engineering Ltd.*

### **3.0 SUBSURFACE CONDITIONS:**

*Full details of the soils encountered in each borehole/monitoring well are given on the Borehole/Monitoring Well Logs, Enclosures 2 to 9, inclusive and the following notes are intended to summarize this data.*

*Monitoring Wells 1 and 2 and Boreholes 4 to 7, inclusive encountered a surficial deposit of **topsoil** ranging between 150 and 325mm thick. The natural moisture content was found to range from 39 to 44%.*

*Monitoring Well 3 encountered an existing paved driveway consisting of 25mm of **asphalt** on 100mm thick granular base.*

*The topsoil at Monitoring Wells 1 and 2 and Boreholes 4, 5 and 7, and the pavement at Monitoring Well 3 were underlain by deposits of **fill** to depths ranging between 0.3 and 3.0 metres below grade. The fill generally consisted of brown silty sand, silty sand and gravel and/or sand and gravel. Standard Penetration tests in the fill gave N-values ranging between 4 and 47 blows/300mm and the natural moisture content was found to range from 3 to 35%.*

*Based on the test results, the deposits of fill are considered to be in a generally very loose to dense condition, although it is noted that the presence of gravel and cobbles in the deposits may have resulted in high N-values and these may not accurately represent the relative density of the soils.*

*The fill at the monitoring wells and boreholes was underlain by a deposit of brown **gravel and sand** to the full depth of the investigation (i.e. 3.5 to 18.7 metres below grade). Thin layers of brown sand and/or silty sand were encountered within the gravel and sand at Monitoring Well 1. Standard Penetration tests in this deposit gave N-values ranging between 16 and greater than 100 blows/300mm and the natural moisture content was found to range from 3 to 10%. A typical grain size distribution curve for this material can be found on Enclosure 9.*

*Based on the test results, the deposit of gravel and sand is considered to have a generally compact to very dense relative density, although it is noted that the presence of gravel and cobbles in the deposit may have resulted in high N-values and these may not accurately represent the relative density of the soil.*

*The gravel and sand at Monitoring Well 1 was underlain by a deposit of grey **sand and silt till** to the full depth of the investigation (i.e.18.7 metres below grade). Standard Penetration tests in this deposit gave an N-value of 0 blows/300mm and the natural moisture content was found to be about 9%. A typical grain size distribution curve can be found on Enclosure 10.*

*Based on the test results, the deposit of sand and silt till is considered to have a very loose relative density.*

**4.0 GROUNDWATER CONDITIONS:**

*Boreholes 4 to 7, inclusive were dry and open to the full depth of the investigation on completion of the fieldwork program.*

*Monitoring Wells 1 and 3 had a free water surface at elevations of 331.0m± and 341.7m± (i.e. 15.0 and 6.1 metres below grade), respectively while Monitoring Well 2 was dry on April 2, 2019.*

*An examination of the soil samples indicated that they were generally moist to wet.*

*It is noted that no sub-artesian water pressures were encountered in any of the boreholes/monitoring wells.*

*Based on the foregoing, the groundwater table is considered to be located at elevations ranging between 331.0m± and 341.7m±.*

## **5.0 DISCUSSION AND RECOMMENDATIONS:**

### **5.1 General:**

*The boreholes encountered a surficial deposit of topsoil and/or pavement underlain by loose to dense fill on a deposit of compact to very dense gravel and sand on a very loose sand and silt till.*

*The groundwater table is considered to be located at elevations ranging between 331.0m± and 341.7m±.*

*Final details concerning the proposed development were not available at the time of this report but it is understood that the preliminary plans are for a four-storey apartment building with two levels of underground parking as well as surface parking. Therefore the following discussion is considered preliminary and it should be reviewed when more details are available.*

### **5.2 Sewers:**

*It is anticipated that the sewer inverts will be located at depths ranging between 3 and 4 metres below existing grade.*

*Reference to the Borehole Logs indicates that the subgrade will generally consist of competent gravel and sand. These deposits will generally provide adequate support for the pipes and allow the use of normal Class 'B' bedding using Granular 'A' material. Clear crushed stone should not be used as bedding unless it is wrapped with geotextile to prevent undesirable settlements caused from fines migrating into the voids of the stone. Where the exposed subgrade is less competent, the bedding thickness may have to be increased and it may be necessary to protect the excavation with a skim coat of concrete immediately after it has been exposed.*

*Where sewer trench grades are below the groundwater table, provisions may be required to lower the groundwater table through pumping from local sumps as and where required or through the use of well points. The sides of the excavation to a depth of more than 1.2 metres (and above the water table) should either be cut back at a side slope of 1 to 1 or supported using adequately braced closed sheeting.*



The excavated materials will be generally suitable for use as trench backfill provided that they are free of topsoil and boulders. If the on-site materials are or become wet, they should be air dried prior to re-use as trench backfill. The trench backfill should be placed in 150 to 200mm thick layers and uniformly compacted to at least 95% of its Standard Proctor maximum dry density. The backfill around manholes should consist of well-graded and well-compacted granular material.

To minimize potential problems and wetting of the subgrade material, backfilling operations should follow closely after excavations, so that only a minimal length of trench is exposed at a time. Should construction be carried out in the winter season, particular attention should be given to make sure no frozen material is used for backfill.

### 5.3 Foundations

The pavement, topsoil, and fill are not considered to be suitable bearing strata. Therefore, the foundations for the proposed structures should extend into the competent native gravel and sand designed to 300 kPa S.L.S/450 kPa U.L.S at the elevations indicated in the following chart:

Location	Borehole Ground Elevation (m±)	Suitable Bearing Stratum Elevation (m±)	Bearing Stratum	Depth to Suitable Bearing Stratum Below Existing Grade (m±)
MW 1	346.0	343.4	Gravel and Sand	2.6
MW 2	346.9	344.6	Gravel and Sand	2.3
MW 3	347.8	345.2	Gravel and Sand	2.6
BH 4	349.9	348.2	Gravel and Sand	1.7
BH 5	349.5	348.9	Gravel and Sand	0.6
BH 6	346.2	345.7	Gravel and Sand	0.5
BH 7	345.2	341.9	Gravel and Sand	3.3

All exterior footings or footings in unheated areas should be located at least 1.2 metres below finished grade for adequate frost protection.

Elevation differences between adjacent footings should not be more than a half of the horizontal distance between them.

*It is estimated that the total and differential settlements of footings designed to these bearing pressures will be less than 25 and 20mm respectively, which are normally considered acceptable for the proposed residential structures.*

*The minimum footing sizes should not be less than those specified in the National Building Code of Canada.*

*It is recommended that all foundation excavations be inspected by geotechnical personnel from V.A. Wood (Guelph) Inc. to ensure the founding soils are similar to those identified in the Test Pit Logs and that they are capable of supporting the design loads.*

*Based on the 2012 Building Code Compendium, the classification of soils for seismic design should be based on the average properties of the top 30 metres of the soil profile. The deepest boreholes were only 18 metres deep and were terminated in very dense gravel and sand. Assuming the very dense deposits extend to depth, the site soils may be classified as Site Class 'C' under the site classification for seismic site response of 2012 Building Code Compendium.*

*For the design of members resisting lateral loads, the recommended soil parameters are as follows:*

<i>Soil Parameters</i>	<i>Loose to Dense Fill</i>	<i>Very Dense Gravel and Sand</i>
<i>Unit Weight</i>	<i>20 kN/m<sup>3</sup></i>	<i>21 kN/m<sup>3</sup></i>
<i>Friction Angle</i>	<i>30°</i>	<i>34°</i>
<i>Cohesion</i>	<i>0</i>	<i>0</i>
<i>Coefficient of Earth Pressure at Rest</i>	<i>0.47</i>	<i>0.44</i>
<i>Coefficient of Active Pressure</i>	<i>0.31</i>	<i>0.28</i>
<i>Coefficient of Passive Pressure</i>	<i>3.2</i>	<i>3.6</i>
<i>Coefficient of Friction</i>	<i>0.35</i>	<i>0.45</i>
<i>Modulus of Subgrade Reaction</i>	<i>25</i>	<i>50 kPa</i>

#### 5.4 Basement/Underground Parking/Retaining Walls:

The basement walls should be designed to resist lateral earth pressures, the magnitude of which can be determined from:

$$p = K(\gamma d + q)$$

where;	$p$	=	earth pressure, kN/m <sup>2</sup>
	$K$	=	earth pressure co-efficient = 0.33, if retaining structure is permitted to move, otherwise $K = 0.5$
	$\gamma$	=	unit weight of backfill, 20 kN/m <sup>2</sup> for sand
	$d$	=	depth below finished grade, metres
	$q$	=	all adjacent surcharge kN/m <sup>2</sup>

Water will tend to collect around the walls and under the slab which, therefore, should be designed to resist hydrostatic pressures unless a perimeter drainage system is installed. Water collected in this system should be connected to the local storm drainage system either by gravity or by a permanent sump pump. Surface drainage around the building should be directed away from the building.

If basement grades are within 0.5m of the measured high groundwater table we recommend that a sub-floor drainage system connected to the local storm drainage system either by gravity or by a permanent sump pump be installed. As well, waterproofing the basement walls would be recommended.

#### 5.5 Excavation, Shoring and Groundwater Control:

No major construction problems due to water are anticipated with excavations above El. 341.7m±. Provision should, however, be made for control of any surface water run-off by pumping from local sumps as and where required.

Excavations to a depth of more than 1.2 metres below grade should be cut back to a side slope of 1 to 1 or, supported using adequately braced sheeting.

5.6 Floor Slabs:

*The subgrade for the underground parking floor slabs will generally consist of compact to very dense gravel and sand. This material will generally provide adequate support for the proposed slabs. The proposed subgrade should be re-compacted from the surface to at least 98% of its Standard Proctor maximum dry density. Any loose/wet material encountered should be sub-excavated and replaced with approved fill.*

*The fill may consist of approved on-site materials free of cobbles/boulders or approved imported fill. All fill should be placed in 150 to 200mm thick lifts and compacted to at least 98% Standard Proctor maximum dry density. It is recommended the underfloor fill be placed at least one month prior to floor construction in order to minimize settlement.*

*A layer of well-graded, free-draining material, at least 150mm thick and compacted to 100% Standard Proctor maximum density, should be placed under the floor slabs to provide a uniform bearing surface and act as a vapour barrier.*

*Frequent inspections by geotechnical personnel from V.A. Wood (Guelph) Inc. should be carried out during construction to verify compaction of the subgrade and base courses by in-situ density testing using nuclear gauges.*

5.7 Surface Pavement Designs:

*All topsoil and any deleterious fill materials encountered should be stripped from the paved area. The underlying subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor maximum dry density prior to construction of the pavement. Any loose areas which are detected should be sub-excavated and backfilled with suitable on-site material or approved imported granular fill. All fill should be placed in 150 to 200mm thick lifts and compacted to at least 98% Standard Proctor maximum dry density.*

*Considering the probable traffic requirements and subsoil conditions, the following pavement designs are recommended:*

	<i>Passenger Car Parking (Light Duty) (mm)</i>	<i>Access Road (Medium Duty) (mm)</i>
<i>Asphaltic Concrete</i>	<i>50</i>	<i>90</i>
<i>Granular 'A' Base Course</i>	<i>150</i>	<i>150</i>
<i>Granular 'B' Sub-base Course</i>	<i>200</i>	<i>300</i>

*The base and sub-base granular materials should be compacted to at least 100% Standard Proctor maximum dry density. The asphalt should be compacted to OPS Specifications.*

*Frequent inspections by geotechnical personnel from V.A. Wood (Guelph) Inc. should be carried out during construction to verify the compaction of the subgrade, base courses and asphaltic concrete by in-situ density testing using nuclear gauges.*

**5.6 Storm Water Management:**

*As per the City of Guelph requirements, Guelph Permeameter testing in the proposed storm water management infiltration galleries will be carried out in the future to determine the hydraulic conductivity of the subsoils for the storm water management design.*

**5.7 Chemical Analysis Results:**

*Representative samples of the subsoils from the boreholes were submitted to the Environmental Division of ALS Laboratory Group for chemical analyses. The analyses included:*

- i) O.Reg. 153/04 as amended by O.Reg. 511 (April 15, 2011) [metals and inorganics].*
- ii) BTEX*
- iii) F1-F4*
- iv) PAH*

The soil samples obtained from the boreholes were submitted as follows.

Chemical Analysis (Subsoils)							
Sample Description	Submission Date	Material Type	Depth (m±)	Eagle Detector Readings (TOV) (ppm)	Staining (Y/N)	Odour (Y/N)	Chemical Testing
ALS #L2244494-1 MW 1, Sam 3	14-Mar-19	Silty Clay Fill	1.5 – 2.0	0	N	N	Metals and Inorganics, BTEX, F1-F4, PAH
ALS #L2244494-2 MW 2, Sam 5	14-Mar-19	Gravel and Sand	3.0 – 3.5	0	N	N	Metals and Inorganics, BTEX, F1-F4, PAH
ALS #L2244494-3 MW 3, Sam 9	14-Mar-19	Gravel and Sand	9.1 – 9.6	0	N	N	Metals and Inorganics, BTEX, F1-F4, PAH
ALS #L2246201-1 MW 3, Sam 3	19-Mar-19	Sand and Gravel Fill	1.5 – 2.0	0	N	N	Metals and Inorganics
ALS #L2246201-2 BH 4, Sam 1	19-Mar-19	Topsoil	0.0 – 0.6	0	N	N	Metals and Inorganics

The analytical results are shown in Appendix 'B'. They indicate:

- topsoil, fill and gravel and sand yielded concentrations below the applicable below the applicable MOE Tables 1 and 2 Site Condition Standards as outlined in Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, March 9, 2004, O.Reg. 153/04 as amended by O.Reg. 511 (April 2011) for all parameters analyzed for residential, parkland, institutional, industrial, commercial, community, agricultural or other property uses **except** for lead in the gravel and sand and topsoil at Boreholes 2 and 4, respectively and mercury in the topsoil at Borehole 4..*

**6.0 STATEMENT OF LIMITATION:**

*The Statement of Limitation presented on Appendix 'A' is an integral part of this report.*

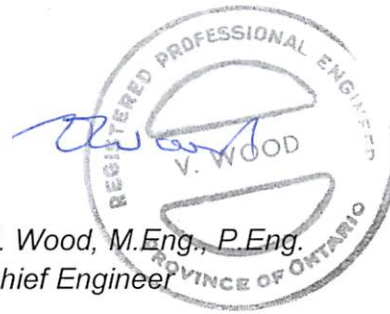
**V.A. WOOD (GUELPH) INC.**



J. Broad, B.A.  
President & General Manager

JB:sm

Encls.



V. Wood, M.Eng., P.Eng.  
Chief Engineer

**APPENDIX 'A'**



**STATEMENT OF LIMITATIONS:**

*The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature, which may be available, for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction, which would not be detected or anticipated at the time of the soil investigation.*

*We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. **In cases where this recommendation is not followed, the company's responsibility is limited to interpreting accurately the information encountered at the boreholes.***

*This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.*

*V.A. Wood (Guelph) Inc. prepared this report for Mar-Cot Developments Inc. The material in it reflects V.A. Wood (Guelph) Inc. judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Parties. V.A. Wood (Guelph) Inc. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.*

***APPENDIX 'B'***



V.A. WOOD (GUELPH)  
ATTN: JOHN BROAD  
405 YORK ROAD  
GUELPH ON N1E 3H3

Date Received: 14-MAR-19  
Report Date: 22-APR-19 14:37 (MT)  
Version: FINAL REV. 2

Client Phone: 519-763-3101

## Certificate of Analysis

Lab Work Order #: L2244494  
Project P.O. #: NOT SUBMITTED  
Job Reference: G4091-19-3  
C of C Numbers: 17-641549  
Legal Site Desc:

Emily Hansen  
Account Manager

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# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2244494-1 G4091-19-3 MW1 SAM 3										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Physical Tests</b>										
% Moisture		16.7		0.10	%	17-MAR-19				
<b>Metals</b>										
Antimony (Sb)		<1.0		1.0	ug/g	20-MAR-19	1	1.3	7.5	40
Arsenic (As)		7.5		1.0	ug/g	20-MAR-19	11	18	18	18
Barium (Ba)		73.2		1.0	ug/g	20-MAR-19	210	220	390	670
Beryllium (Be)		0.66		0.50	ug/g	20-MAR-19	2.5	2.5	4	8
Boron (B)		<5.0		5.0	ug/g	20-MAR-19	36	36	120	120
Cadmium (Cd)		<0.50		0.50	ug/g	20-MAR-19	1	1.2	1.2	1.9
Chromium (Cr)		21.2		1.0	ug/g	20-MAR-19	67	70	160	160
Cobalt (Co)		7.8		1.0	ug/g	20-MAR-19	19	21	22	80
Copper (Cu)		19.1		1.0	ug/g	20-MAR-19	62	92	140	230
Lead (Pb)		30.8		1.0	ug/g	20-MAR-19	45	120	120	120
Molybdenum (Mo)		<1.0		1.0	ug/g	20-MAR-19	2	2	6.9	40
Nickel (Ni)		15.2		1.0	ug/g	20-MAR-19	37	82	100	270
Selenium (Se)		<1.0		1.0	ug/g	20-MAR-19	1.2	1.5	2.4	5.5
Silver (Ag)		<0.20		0.20	ug/g	20-MAR-19	0.5	0.5	20	40
Thallium (Tl)		<0.50		0.50	ug/g	20-MAR-19	1	1	1	3.3
Uranium (U)		<1.0		1.0	ug/g	20-MAR-19	1.9	2.5	23	33
Vanadium (V)		39.2		1.0	ug/g	20-MAR-19	86	86	86	86
Zinc (Zn)		141		5.0	ug/g	20-MAR-19	290	290	340	340
<b>Volatile Organic Compounds</b>										
Benzene		<0.0068		0.0068	ug/g	20-MAR-19	0.02	0.02	0.21	0.32
Ethylbenzene		<0.018		0.018	ug/g	20-MAR-19	0.05	0.05	1.1	1.1
Toluene		<0.080		0.080	ug/g	20-MAR-19	0.2	0.2	2.3	6.4
o-Xylene		<0.020		0.020	ug/g	20-MAR-19				
m+p-Xylenes		<0.030		0.030	ug/g	20-MAR-19				
Xylenes (Total)		<0.050		0.050	ug/g	20-MAR-19	0.05	0.05	3.1	26
Surrogate: 4-Bromofluorobenzene		86.2		50-140	%	20-MAR-19				
Surrogate: 1,4-Difluorobenzene		92.3		50-140	%	20-MAR-19				
<b>Hydrocarbons</b>										
F1 (C6-C10)		<5.0		5.0	ug/g	20-MAR-19	17	25	55	55
F1-BTEX		<5.0		5.0	ug/g	21-MAR-19	17	25	55	55
F2 (C10-C16)		<10		10	ug/g	20-MAR-19	10	10	98	230
F2-Naphth		<10		10	ug/g	21-MAR-19				
F3 (C16-C34)		<50		50	ug/g	20-MAR-19	240	240	300	1700
F3-PAH		<50		50	ug/g	21-MAR-19				
F4 (C34-C50)		<50		50	ug/g	20-MAR-19	120	120	2800	3300
Total Hydrocarbons (C6-C50)		<72		72	ug/g	21-MAR-19				
Chrom. to baseline at nC50		YES			No Unit	20-MAR-19				
Surrogate: 2-Bromobenzotrifluoride		94.2		60-140	%	20-MAR-19				
Surrogate: 3,4-Dichlorotoluene		96.6		60-140	%	20-MAR-19				
<b>Polycyclic Aromatic Hydrocarbons</b>										
Acenaphthene		<0.050		0.050	ug/g	21-MAR-19	0.05	0.072	7.9	21
Acenaphthylene		<0.050		0.050	ug/g	21-MAR-19	0.093	0.093	0.15	0.15
Anthracene		<0.050		0.050	ug/g	21-MAR-19	0.05	0.16	0.67	0.67
Benzo(a)anthracene		<0.050		0.050	ug/g	21-MAR-19	0.095	0.36	0.5	0.96

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

**Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C**

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2244494-1 G4091-19-3 MW1 SAM 3										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Polycyclic Aromatic Hydrocarbons</b>										
	Benzo(a)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.3	0.3	0.3
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.3	0.47	0.78	0.96
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	21-MAR-19	0.2	0.68	6.6	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.48	0.78	0.96
	Chrysene	<0.050		0.050	ug/g	21-MAR-19	0.18	2.8	7	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	21-MAR-19	0.1	0.1	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.24	0.56	0.69	9.6
	Fluorene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.12	62	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.11	0.23	0.38	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	21-MAR-19	0.05	0.59	0.99	30
	1-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	2-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	Naphthalene	<0.013		0.013	ug/g	21-MAR-19	0.05	0.09	0.6	9.6
	Phenanthrene	<0.046		0.046	ug/g	21-MAR-19	0.19	0.69	6.2	12
	Pyrene	<0.050		0.050	ug/g	21-MAR-19	0.19	1	78	96
	Surrogate: 2-Fluorobiphenyl	109.5		50-140	%	21-MAR-19				
	Surrogate: p-Terphenyl d14	104.4		50-140	%	21-MAR-19				
L2244494-2 G4091-19-3 MW2 SAM 5										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Physical Tests</b>										
	% Moisture	4.30		0.10	%	17-MAR-19				
<b>Metals</b>										
	Antimony (Sb)	<1.0		1.0	ug/g	20-MAR-19	1	1.3	7.5	40
	Arsenic (As)	4.5		1.0	ug/g	20-MAR-19	11	18	18	18
	Barium (Ba)	13.1		1.0	ug/g	20-MAR-19	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	20-MAR-19	2.5	2.5	4	8
	Boron (B)	7.1		5.0	ug/g	20-MAR-19	36	36	120	120
	Cadmium (Cd)	0.52		0.50	ug/g	20-MAR-19	1	1.2	1.2	1.9
	Chromium (Cr)	7.1		1.0	ug/g	20-MAR-19	67	70	160	160
	Cobalt (Co)	3.0		1.0	ug/g	20-MAR-19	19	21	22	80
	Copper (Cu)	12.5		1.0	ug/g	20-MAR-19	62	92	140	230
	Lead (Pb)	125		1.0	ug/g	20-MAR-19	*45	*120	*120	*120
	Molybdenum (Mo)	<1.0		1.0	ug/g	20-MAR-19	2	2	6.9	40
	Nickel (Ni)	5.8		1.0	ug/g	20-MAR-19	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	20-MAR-19	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	20-MAR-19	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	20-MAR-19	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	20-MAR-19	1.9	2.5	23	33
	Vanadium (V)	11.2		1.0	ug/g	20-MAR-19	86	86	86	86
	Zinc (Zn)	243		5.0	ug/g	20-MAR-19	290	290	340	340
<b>Volatile Organic Compounds</b>										
	Benzene	<0.0068		0.0068	ug/g	20-MAR-19	0.02	0.02	0.21	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-MAR-19	0.05	0.05	1.1	1.1

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

**Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C**

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2244494-2 G4091-19-3 MW2 SAM 5										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Volatile Organic Compounds</b>										
	Toluene	<0.080		0.080	ug/g	20-MAR-19	0.2	0.2	2.3	6.4
	o-Xylene	<0.020		0.020	ug/g	20-MAR-19				
	m+p-Xylenes	<0.030		0.030	ug/g	20-MAR-19				
	Xylenes (Total)	<0.050		0.050	ug/g	20-MAR-19	0.05	0.05	3.1	26
	Surrogate: 4-Bromofluorobenzene	95.6		50-140	%	20-MAR-19				
	Surrogate: 1,4-Difluorobenzene	102.6		50-140	%	20-MAR-19				
<b>Hydrocarbons</b>										
	F1 (C6-C10)	<5.0		5.0	ug/g	20-MAR-19	17	25	55	55
	F1-BTEX	<5.0		5.0	ug/g	21-MAR-19	17	25	55	55
	F2 (C10-C16)	<10		10	ug/g	19-MAR-19	10	10	98	230
	F2-Naphth	<10		10	ug/g	21-MAR-19				
	F3 (C16-C34)	<50		50	ug/g	19-MAR-19	240	240	300	1700
	F3-PAH	<50		50	ug/g	21-MAR-19				
	F4 (C34-C50)	<50		50	ug/g	19-MAR-19	120	120	2800	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	21-MAR-19				
	Chrom. to baseline at nC50	YES			No Unit	19-MAR-19				
	Surrogate: 2-Bromobenzotrifluoride	100.3		60-140	%	19-MAR-19				
	Surrogate: 3,4-Dichlorotoluene	100.1		60-140	%	20-MAR-19				
<b>Polycyclic Aromatic Hydrocarbons</b>										
	Acenaphthene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.072	7.9	21
	Acenaphthylene	<0.050		0.050	ug/g	21-MAR-19	0.093	0.093	0.15	0.15
	Anthracene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.16	0.67	0.67
	Benzo(a)anthracene	<0.050		0.050	ug/g	21-MAR-19	0.095	0.36	0.5	0.96
	Benzo(a)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.3	0.3	0.3
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.3	0.47	0.78	0.96
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	21-MAR-19	0.2	0.68	6.6	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.48	0.78	0.96
	Chrysene	<0.050		0.050	ug/g	21-MAR-19	0.18	2.8	7	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	21-MAR-19	0.1	0.1	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.24	0.56	0.69	9.6
	Fluorene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.12	62	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.11	0.23	0.38	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	21-MAR-19	0.05	0.59	0.99	30
	1-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	2-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	Naphthalene	<0.013		0.013	ug/g	21-MAR-19	0.05	0.09	0.6	9.6
	Phenanthrene	<0.046		0.046	ug/g	21-MAR-19	0.19	0.69	6.2	12
	Pyrene	<0.050		0.050	ug/g	21-MAR-19	0.19	1	78	96
	Surrogate: 2-Fluorobiphenyl	110.5		50-140	%	21-MAR-19				
	Surrogate: p-Terphenyl d14	108.9		50-140	%	21-MAR-19				
L2244494-3 G4091-19-3 MW3 SAM 9										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Physical Tests</b>										
	% Moisture	4.66		0.10	%	17-MAR-19				

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

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#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2244494-3 G4091-19-3 MW3 SAM 9										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Metals</b>										
	Antimony (Sb)	<1.0		1.0	ug/g	20-MAR-19	1	1.3	7.5	40
	Arsenic (As)	2.9		1.0	ug/g	20-MAR-19	11	18	18	18
	Barium (Ba)	13.3		1.0	ug/g	20-MAR-19	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	20-MAR-19	2.5	2.5	4	8
	Boron (B)	<5.0		5.0	ug/g	20-MAR-19	36	36	120	120
	Cadmium (Cd)	<0.50		0.50	ug/g	20-MAR-19	1	1.2	1.2	1.9
	Chromium (Cr)	6.4		1.0	ug/g	20-MAR-19	67	70	160	160
	Cobalt (Co)	2.8		1.0	ug/g	20-MAR-19	19	21	22	80
	Copper (Cu)	17.0		1.0	ug/g	20-MAR-19	62	92	140	230
	Lead (Pb)	28.3		1.0	ug/g	20-MAR-19	45	120	120	120
	Molybdenum (Mo)	<1.0		1.0	ug/g	20-MAR-19	2	2	6.9	40
	Nickel (Ni)	5.7		1.0	ug/g	20-MAR-19	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	20-MAR-19	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	20-MAR-19	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	20-MAR-19	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	20-MAR-19	1.9	2.5	23	33
	Vanadium (V)	17.9		1.0	ug/g	20-MAR-19	86	86	86	86
	Zinc (Zn)	183		5.0	ug/g	20-MAR-19	290	290	340	340
<b>Volatile Organic Compounds</b>										
	Benzene	<0.0068		0.0068	ug/g	20-MAR-19	0.02	0.02	0.21	0.32
	Ethylbenzene	<0.018		0.018	ug/g	20-MAR-19	0.05	0.05	1.1	1.1
	Toluene	<0.080		0.080	ug/g	20-MAR-19	0.2	0.2	2.3	6.4
	o-Xylene	<0.020		0.020	ug/g	20-MAR-19				
	m+p-Xylenes	<0.030		0.030	ug/g	20-MAR-19				
	Xylenes (Total)	<0.050		0.050	ug/g	20-MAR-19	0.05	0.05	3.1	26
	Surrogate: 4-Bromofluorobenzene	87.1		50-140	%	20-MAR-19				
	Surrogate: 1,4-Difluorobenzene	94.7		50-140	%	20-MAR-19				
<b>Hydrocarbons</b>										
	F1 (C6-C10)	<5.0		5.0	ug/g	20-MAR-19	17	25	55	55
	F1-BTEX	<5.0		5.0	ug/g	21-MAR-19	17	25	55	55
	F2 (C10-C16)	<10		10	ug/g	19-MAR-19	10	10	98	230
	F2-Naphth	<10		10	ug/g	21-MAR-19				
	F3 (C16-C34)	<50		50	ug/g	19-MAR-19	240	240	300	1700
	F3-PAH	<50		50	ug/g	21-MAR-19				
	F4 (C34-C50)	<50		50	ug/g	19-MAR-19	120	120	2800	3300
	Total Hydrocarbons (C6-C50)	<72		72	ug/g	21-MAR-19				
	Chrom. to baseline at nC50	YES			No Unit	19-MAR-19				
	Surrogate: 2-Bromobenzotrifluoride	95.5		60-140	%	19-MAR-19				
	Surrogate: 3,4-Dichlorotoluene	99.1		60-140	%	20-MAR-19				
<b>Polycyclic Aromatic Hydrocarbons</b>										
	Acenaphthene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.072	7.9	21
	Acenaphthylene	<0.050		0.050	ug/g	21-MAR-19	0.093	0.093	0.15	0.15
	Anthracene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.16	0.67	0.67
	Benzo(a)anthracene	<0.050		0.050	ug/g	21-MAR-19	0.095	0.36	0.5	0.96
	Benzo(a)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.3	0.3	0.3
	Benzo(b)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.3	0.47	0.78	0.96

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

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#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping							#1	#2	#3	#4
L2244494-3 G4091-19-3 MW3 SAM 9										
Sampled By: CLIENT on 14-MAR-19 @ 10:30										
Matrix: SOIL										
<b>Polycyclic Aromatic Hydrocarbons</b>										
	Benzo(g,h,i)perylene	<0.050		0.050	ug/g	21-MAR-19	0.2	0.68	6.6	9.6
	Benzo(k)fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.48	0.78	0.96
	Chrysene	<0.050		0.050	ug/g	21-MAR-19	0.18	2.8	7	9.6
	Dibenzo(ah)anthracene	<0.050		0.050	ug/g	21-MAR-19	0.1	0.1	0.1	0.1
	Fluoranthene	<0.050		0.050	ug/g	21-MAR-19	0.24	0.56	0.69	9.6
	Fluorene	<0.050		0.050	ug/g	21-MAR-19	0.05	0.12	62	62
	Indeno(1,2,3-cd)pyrene	<0.050		0.050	ug/g	21-MAR-19	0.11	0.23	0.38	0.76
	1+2-Methylnaphthalenes	<0.042		0.042	ug/g	21-MAR-19	0.05	0.59	0.99	30
	1-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	2-Methylnaphthalene	<0.030		0.030	ug/g	21-MAR-19	0.05	0.59	0.99	30
	Naphthalene	<0.013		0.013	ug/g	21-MAR-19	0.05	0.09	0.6	9.6
	Phenanthrene	<0.046		0.046	ug/g	21-MAR-19	0.19	0.69	6.2	12
	Pyrene	<0.050		0.050	ug/g	21-MAR-19	0.19	1	78	96
	Surrogate: 2-Fluorobiphenyl	64.1		50-140	%	21-MAR-19				
	Surrogate: p-Terphenyl d14	87.0		50-140	%	21-MAR-19				

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

**Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C**

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#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)



## Reference Information

## Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
BTX-511-HS-WT	Soil	BTEX-O.Reg 153/04 (July 2011)	SW846 8260

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

F1-F4-511-CALC-WT	Soil	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-S
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Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

In samples where BTEX and F1 were analyzed, F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Soil	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS
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Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Soil	F2-F4-O.Reg 153/04 (July 2011)	CCME Tier 1
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Petroleum Hydrocarbons (F2-F4 fractions) are extracted from soil with 1:1 hexane:acetone using a rotary extractor. Extracts are treated with silica gel to remove polar organic interferences. F2, F3, & F4 are analyzed by GC-FID. F4G-sg is analyzed gravimetrically.

## Notes:

1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where both F4 (C34-C50) and F4G-sg are reported for a sample, the larger of the two values is used for comparison against the relevant CCME guideline for F4.
7. F4G-sg cannot be added to the C6 to C50 hydrocarbon results to obtain an estimate of total extractable hydrocarbons.
8. This method is validated for use.
9. Data from analysis of validation and quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram, unless otherwise indicated.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
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Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the <2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H<sub>2</sub>S) may be excluded if lost during sampling, storage, or digestion.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

## Reference Information

METHYLNAPS-CALC-WT	Soil	ABN-Calculated Parameters	SW846 8270
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PAH-511-WT	Soil	PAH-O.Reg 153/04 (July 2011)	SW846 3510/8270

A representative sub-sample of soil is fortified with deuterium-labelled surrogates and a mechanical shaking technique is used to extract the sample with a mixture of methanol and toluene. The extracts are concentrated and analyzed by GC/MS. Results for benzo(b) fluoranthene may include contributions from benzo(j)fluoranthene, if also present in the sample.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION
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Total xylenes represents the sum of o-xylene and m&p-xylene.

\*\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

17-641549

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

## GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample  
 mg/kg wwt - milligrams per kilogram based on wet weight of sample  
 mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight  
 mg/L - unit of concentration based on volume, parts per million.  
 < - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTX-511-HS-WT		Soil						
<b>Batch</b>	<b>R4573668</b>							
<b>WG3008713-4</b>	<b>DUP</b>	<b>WG3008713-3</b>						
Benzene		<0.0068	<0.0068	RPD-NA	ug/g	N/A	40	20-MAR-19
Ethylbenzene		<0.018	<0.018	RPD-NA	ug/g	N/A	40	20-MAR-19
m+p-Xylenes		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-MAR-19
o-Xylene		<0.020	<0.020	RPD-NA	ug/g	N/A	40	20-MAR-19
Toluene		<0.080	<0.080	RPD-NA	ug/g	N/A	40	20-MAR-19
<b>WG3008713-2</b>	<b>LCS</b>							
Benzene			92.6		%		70-130	20-MAR-19
Ethylbenzene			89.3		%		70-130	20-MAR-19
m+p-Xylenes			89.1		%		70-130	20-MAR-19
o-Xylene			88.3		%		70-130	20-MAR-19
Toluene			91.3		%		70-130	20-MAR-19
<b>WG3008713-1</b>	<b>MB</b>							
Benzene			<0.0068		ug/g		0.0068	20-MAR-19
Ethylbenzene			<0.018		ug/g		0.018	20-MAR-19
m+p-Xylenes			<0.030		ug/g		0.03	20-MAR-19
o-Xylene			<0.020		ug/g		0.02	20-MAR-19
Toluene			<0.080		ug/g		0.08	20-MAR-19
Surrogate: 1,4-Difluorobenzene			101.5		%		50-140	20-MAR-19
Surrogate: 4-Bromofluorobenzene			96.2		%		50-140	20-MAR-19
<b>WG3008713-5</b>	<b>MS</b>	<b>L2244298-3</b>						
Benzene			96.7		%		60-140	20-MAR-19
Ethylbenzene			92.4		%		60-140	20-MAR-19
m+p-Xylenes			91.0		%		60-140	20-MAR-19
o-Xylene			90.4		%		60-140	20-MAR-19
Toluene			94.0		%		60-140	20-MAR-19
F1-HS-511-WT		Soil						
<b>Batch</b>	<b>R4573668</b>							
<b>WG3008713-4</b>	<b>DUP</b>	<b>WG3008713-3</b>						
F1 (C6-C10)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	20-MAR-19
<b>WG3008713-2</b>	<b>LCS</b>							
F1 (C6-C10)			101.0		%		80-120	20-MAR-19
<b>WG3008713-1</b>	<b>MB</b>							
F1 (C6-C10)			<5.0		ug/g		5	20-MAR-19
Surrogate: 3,4-Dichlorotoluene			111.6		%		60-140	20-MAR-19
<b>WG3008713-6</b>	<b>MS</b>	<b>L2244298-2</b>						



# Quality Control Report

Workorder: L224494 Report Date: 22-APR-19

Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 JOHN BROAD  
 Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
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F1-HS-511-WT Soil

Batch R4573668

WG3008713-6 MS

L2244298-2

F1 (C6-C10) 99.8 % 60-140 20-MAR-19

F2-F4-511-WT Soil

Batch R4571550

WG3008331-3 DUF

WG3008331-5

F2 (C10-C16) <10 % 30 19-MAR-19

F3 (C16-C34) <50 % 30 19-MAR-19

F4 (C34-C50) <50 % 30 19-MAR-19

WG3008331-2 LCS

F2 (C10-C16) 98.6 % 80-120 19-MAR-19

F3 (C16-C34) 102.5 % 80-120 19-MAR-19

F4 (C34-C50) 107.6 % 80-120 19-MAR-19

WG3008331-1 MB

F2 (C10-C16) <10 % 10 19-MAR-19

F3 (C16-C34) <50 % 50 19-MAR-19

F4 (C34-C50) <50 % 50 19-MAR-19

Surrogate: 2-Bromobenzo-trifluoride

WG3008331-4 MS

WG3008331-5

F2 (C10-C16) 105.3 % 60-140 19-MAR-19

F3 (C16-C34) 110.8 % 60-140 19-MAR-19

F4 (C34-C50) 117.4 % 60-140 19-MAR-19

Batch R4573488

WG3009783-3 DUF

WG3009783-5

F2 (C10-C16) <10 % 30 20-MAR-19

F3 (C16-C34) <50 % 30 20-MAR-19

F4 (C34-C50) <50 % 30 20-MAR-19

WG3009783-2 LCS

F2 (C10-C16) 93.6 % 80-120 20-MAR-19

F3 (C16-C34) 96.8 % 80-120 20-MAR-19

F4 (C34-C50) 101.9 % 80-120 20-MAR-19

WG3009783-1 MB

F2 (C10-C16) <10 % 10 20-MAR-19

F3 (C16-C34) <50 % 50 20-MAR-19

F4 (C34-C50) <50 % 50 20-MAR-19

Surrogate: 2-Bromobenzo-trifluoride

89.5 % 60-140 20-MAR-19



## Quality Control Report

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-511-WT	Soil							
<b>Batch</b>	<b>R4573488</b>							
<b>WG3009783-4 MS</b>		<b>WG3009783-5</b>						
F2 (C10-C16)			97.5		%		60-140	20-MAR-19
F3 (C16-C34)			100.6		%		60-140	20-MAR-19
F4 (C34-C50)			105.0		%		60-140	20-MAR-19
MET-200.2-CCMS-WT	Soil							
<b>Batch</b>	<b>R4573663</b>							
<b>WG3009844-2 CRM</b>		<b>WT-CANMET-TILL1</b>						
Antimony (Sb)			112.3		%		70-130	20-MAR-19
Arsenic (As)			111.6		%		70-130	20-MAR-19
Barium (Ba)			113.7		%		70-130	20-MAR-19
Beryllium (Be)			105.3		%		70-130	20-MAR-19
Boron (B)			2.8		mg/kg		0-8.2	20-MAR-19
Cadmium (Cd)			112.9		%		70-130	20-MAR-19
Chromium (Cr)			108.6		%		70-130	20-MAR-19
Cobalt (Co)			107.8		%		70-130	20-MAR-19
Copper (Cu)			109.8		%		70-130	20-MAR-19
Lead (Pb)			112.6		%		70-130	20-MAR-19
Molybdenum (Mo)			110.6		%		70-130	20-MAR-19
Nickel (Ni)			107.8		%		70-130	20-MAR-19
Selenium (Se)			0.34		mg/kg		0.11-0.51	20-MAR-19
Silver (Ag)			0.25		mg/kg		0.13-0.33	20-MAR-19
Thallium (Tl)			0.132		mg/kg		0.077-0.18	20-MAR-19
Uranium (U)			107.2		%		70-130	20-MAR-19
Vanadium (V)			108.4		%		70-130	20-MAR-19
Zinc (Zn)			104.5		%		70-130	20-MAR-19
<b>WG3009844-6 DUP</b>		<b>WG3009844-5</b>						
Antimony (Sb)		0.21	0.20		ug/g	2.1	30	20-MAR-19
Arsenic (As)		4.10	3.82		ug/g	7.3	30	20-MAR-19
Barium (Ba)		153	116		ug/g	28	40	20-MAR-19
Beryllium (Be)		0.59	0.60		ug/g	1.0	30	20-MAR-19
Boron (B)		5.3	5.2		ug/g	1.3	30	20-MAR-19
Cadmium (Cd)		0.211	0.227		ug/g	7.6	30	20-MAR-19
Chromium (Cr)		21.7	21.2		ug/g	2.1	30	20-MAR-19
Cobalt (Co)		8.81	8.46		ug/g	4.0	30	20-MAR-19
Copper (Cu)		15.8	15.3		ug/g			20-MAR-19



## Quality Control Report

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
<b>Batch R4573663</b>								
<b>WG3009844-6</b>	<b>DUP</b>	<b>WG3009844-5</b>						
Copper (Cu)		15.8	15.3		ug/g	3.1	30	20-MAR-19
Lead (Pb)		25.7	25.7		ug/g	0.1	40	20-MAR-19
Molybdenum (Mo)		0.47	0.46		ug/g	2.9	40	20-MAR-19
Nickel (Ni)		17.1	16.8		ug/g	1.6	30	20-MAR-19
Selenium (Se)		0.27	0.28		ug/g	4.5	30	20-MAR-19
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	20-MAR-19
Thallium (Tl)		0.136	0.140		ug/g	2.5	30	20-MAR-19
Uranium (U)		0.505	0.502		ug/g	0.5	30	20-MAR-19
Vanadium (V)		34.2	33.7		ug/g	1.5	30	20-MAR-19
Zinc (Zn)		95.5	87.3		ug/g	9.0	30	20-MAR-19
<b>WG3009844-4</b>	<b>LCS</b>							
Antimony (Sb)			107.0		%		80-120	20-MAR-19
Arsenic (As)			98.4		%		80-120	20-MAR-19
Barium (Ba)			101.6		%		80-120	20-MAR-19
Beryllium (Be)			97.2		%		80-120	20-MAR-19
Boron (B)			93.2		%		80-120	20-MAR-19
Cadmium (Cd)			96.6		%		80-120	20-MAR-19
Chromium (Cr)			98.4		%		80-120	20-MAR-19
Cobalt (Co)			96.3		%		80-120	20-MAR-19
Copper (Cu)			95.6		%		80-120	20-MAR-19
Lead (Pb)			98.0		%		80-120	20-MAR-19
Molybdenum (Mo)			102.6		%		80-120	20-MAR-19
Nickel (Ni)			96.0		%		80-120	20-MAR-19
Selenium (Se)			99.3		%		80-120	20-MAR-19
Silver (Ag)			102.0		%		80-120	20-MAR-19
Thallium (Tl)			97.7		%		80-120	20-MAR-19
Uranium (U)			99.0		%		80-120	20-MAR-19
Vanadium (V)			101.2		%		80-120	20-MAR-19
Zinc (Zn)			97.1		%		80-120	20-MAR-19
<b>WG3009844-1</b>	<b>MB</b>							
Antimony (Sb)			<0.10		mg/kg		0.1	20-MAR-19
Arsenic (As)			<0.10		mg/kg		0.1	20-MAR-19
Barium (Ba)			<0.50		mg/kg		0.5	20-MAR-19
Beryllium (Be)			<0.10		mg/kg		0.1	20-MAR-19



## Quality Control Report

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
Batch R4573663								
WG3009844-1 MB								
Boron (B)			<5.0		mg/kg		5	20-MAR-19
Cadmium (Cd)			<0.020		mg/kg		0.02	20-MAR-19
Chromium (Cr)			<0.50		mg/kg		0.5	20-MAR-19
Cobalt (Co)			<0.10		mg/kg		0.1	20-MAR-19
Copper (Cu)			<0.50		mg/kg		0.5	20-MAR-19
Lead (Pb)			<0.50		mg/kg		0.5	20-MAR-19
Molybdenum (Mo)			<0.10		mg/kg		0.1	20-MAR-19
Nickel (Ni)			<0.50		mg/kg		0.5	20-MAR-19
Selenium (Se)			<0.20		mg/kg		0.2	20-MAR-19
Silver (Ag)			<0.10		mg/kg		0.1	20-MAR-19
Thallium (Tl)			<0.050		mg/kg		0.05	20-MAR-19
Uranium (U)			<0.050		mg/kg		0.05	20-MAR-19
Vanadium (V)			<0.20		mg/kg		0.2	20-MAR-19
Zinc (Zn)			<2.0		mg/kg		2	20-MAR-19
MOISTURE-WT		Soil						
Batch R4568352								
WG3007826-8 DUP		L2244137-1						
% Moisture		89.0	89.4		%	0.4	20	17-MAR-19
WG3007826-7 LCS								
% Moisture			100.2		%		90-110	17-MAR-19
WG3007826-6 MB								
% Moisture			<0.10		%		0.1	17-MAR-19
PAH-511-WT		Soil						
Batch R4572647								
WG3007282-3 DUP		WG3007282-5						
1-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-MAR-19
2-Methylnaphthalene		<0.030	<0.030	RPD-NA	ug/g	N/A	40	20-MAR-19
Acenaphthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Acenaphthylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Benzo(a)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Benzo(b)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19



## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3

Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	Soil							
<b>Batch</b>	<b>R4572647</b>							
<b>WG3007282-3 DUP</b>		<b>WG3007282-5</b>						
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Chrysene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Fluorene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
Naphthalene		<0.013	<0.013	RPD-NA	ug/g	N/A	40	20-MAR-19
Phenanthrene		<0.046	<0.046	RPD-NA	ug/g	N/A	40	20-MAR-19
Pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	20-MAR-19
<b>WG3007282-2 LCS</b>								
1-Methylnaphthalene			99.5		%		50-140	20-MAR-19
2-Methylnaphthalene			95.9		%		50-140	20-MAR-19
Acenaphthene			103.3		%		50-140	20-MAR-19
Acenaphthylene			94.2		%		50-140	20-MAR-19
Anthracene			97.1		%		50-140	20-MAR-19
Benzo(a)anthracene			98.2		%		50-140	20-MAR-19
Benzo(a)pyrene			98.5		%		50-140	20-MAR-19
Benzo(b)fluoranthene			90.0		%		50-140	20-MAR-19
Benzo(g,h,i)perylene			93.3		%		50-140	20-MAR-19
Benzo(k)fluoranthene			107.6		%		50-140	20-MAR-19
Chrysene			97.7		%		50-140	20-MAR-19
Dibenzo(ah)anthracene			81.1		%		50-140	20-MAR-19
Fluoranthene			93.9		%		50-140	20-MAR-19
Fluorene			96.2		%		50-140	20-MAR-19
Indeno(1,2,3-cd)pyrene			76.1		%		50-140	20-MAR-19
Naphthalene			96.1		%		50-140	20-MAR-19
Phenanthrene			100.1		%		50-140	20-MAR-19
Pyrene			93.8		%		50-140	20-MAR-19
<b>WG3007282-1 MB</b>								
1-Methylnaphthalene			<0.030		ug/g		0.03	20-MAR-19
2-Methylnaphthalene			<0.030		ug/g		0.03	20-MAR-19
Acenaphthene			<0.050		ug/g		0.05	20-MAR-19
Acenaphthylene			<0.050		ug/g		0.05	20-MAR-19
Anthracene			<0.050		ug/g		0.05	20-MAR-19





## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	Soil							
<b>Batch</b>	<b>R4572647</b>							
<b>WG3007282-1 MB</b>								
Benzo(a)anthracene			<0.050		ug/g		0.05	20-MAR-19
Benzo(a)pyrene			<0.050		ug/g		0.05	20-MAR-19
Benzo(b)fluoranthene			<0.050		ug/g		0.05	20-MAR-19
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	20-MAR-19
Benzo(k)fluoranthene			<0.050		ug/g		0.05	20-MAR-19
Chrysene			<0.050		ug/g		0.05	20-MAR-19
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	20-MAR-19
Fluoranthene			<0.050		ug/g		0.05	20-MAR-19
Fluorene			<0.050		ug/g		0.05	20-MAR-19
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	20-MAR-19
Naphthalene			<0.013		ug/g		0.013	20-MAR-19
Phenanthrene			<0.046		ug/g		0.046	20-MAR-19
Pyrene			<0.050		ug/g		0.05	20-MAR-19
Surrogate: 2-Fluorobiphenyl			112.1		%		50-140	20-MAR-19
Surrogate: p-Terphenyl d14			105.4		%		50-140	20-MAR-19
<b>WG3007282-4 MS</b>		<b>WG3007282-5</b>						
1-Methylnaphthalene			97.8		%		50-140	20-MAR-19
2-Methylnaphthalene			96.3		%		50-140	20-MAR-19
Acenaphthene			104.2		%		50-140	20-MAR-19
Acenaphthylene			95.6		%		50-140	20-MAR-19
Anthracene			99.0		%		50-140	20-MAR-19
Benzo(a)anthracene			105.1		%		50-140	20-MAR-19
Benzo(a)pyrene			99.9		%		50-140	20-MAR-19
Benzo(b)fluoranthene			108.1		%		50-140	20-MAR-19
Benzo(g,h,i)perylene			97.9		%		50-140	20-MAR-19
Benzo(k)fluoranthene			98.8		%		50-140	20-MAR-19
Chrysene			101.3		%		50-140	20-MAR-19
Dibenzo(ah)anthracene			86.1		%		50-140	20-MAR-19
Fluoranthene			103.8		%		50-140	20-MAR-19
Fluorene			99.0		%		50-140	20-MAR-19
Indeno(1,2,3-cd)pyrene			90.9		%		50-140	20-MAR-19
Naphthalene			95.1		%		50-140	20-MAR-19
Phenanthrene			100.4		%		50-140	20-MAR-19
Pyrene			103.4		%		50-140	20-MAR-19



## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

Page 8 of 11

Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	Soil							
<b>Batch</b>	<b>R4575591</b>							
<b>WG3007741-3 DUP</b>		<b>WG3007741-5</b>						
1-Methylnaphthalene		41.9	39.8		ug/g	5.2	40	21-MAR-19
2-Methylnaphthalene		55.4	52.7		ug/g	5.0	40	21-MAR-19
Acenaphthene		1.53	1.46		ug/g	4.6	40	21-MAR-19
Acenaphthylene		0.320	0.299		ug/g	6.8	40	21-MAR-19
Anthracene		0.638	0.437		ug/g	37	40	21-MAR-19
Benzo(a)anthracene		0.214	0.176		ug/g	19	40	21-MAR-19
Benzo(a)pyrene		0.075	0.077		ug/g	3.3	40	21-MAR-19
Benzo(b)fluoranthene		0.071	0.059		ug/g	18	40	21-MAR-19
Benzo(g,h,i)perylene		0.054	<0.050	RPD-NA	ug/g	N/A	40	21-MAR-19
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-MAR-19
Chrysene		0.383	0.346		ug/g	10	40	21-MAR-19
Dibenzo(ah)anthracene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-MAR-19
Fluoranthene		0.321	0.302		ug/g	6.1	40	21-MAR-19
Fluorene		1.52	1.47		ug/g	3.5	40	21-MAR-19
Indeno(1,2,3-cd)pyrene		<0.050	<0.050	RPD-NA	ug/g	N/A	40	21-MAR-19
Naphthalene		32.6	30.8		ug/g	5.7	40	21-MAR-19
Phenanthrene		3.67	3.42		ug/g	7.1	40	21-MAR-19
Pyrene		0.980	0.837		ug/g	16	40	21-MAR-19
<b>WG3007741-2 LCS</b>								
1-Methylnaphthalene			95.4		%		50-140	21-MAR-19
2-Methylnaphthalene			90.1		%		50-140	21-MAR-19
Acenaphthene			99.4		%		50-140	21-MAR-19
Acenaphthylene			91.9		%		50-140	21-MAR-19
Anthracene			96.5		%		50-140	21-MAR-19
Benzo(a)anthracene			97.1		%		50-140	21-MAR-19
Benzo(a)pyrene			104.2		%		50-140	21-MAR-19
Benzo(b)fluoranthene			104.2		%		50-140	21-MAR-19
Benzo(g,h,i)perylene			109.0		%		50-140	21-MAR-19
Benzo(k)fluoranthene			121.8		%		50-140	21-MAR-19
Chrysene			104.0		%		50-140	21-MAR-19
Dibenzo(ah)anthracene			104.8		%		50-140	21-MAR-19
Fluoranthene			103.0		%		50-140	21-MAR-19
Fluorene			93.1		%		50-140	21-MAR-19



## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

Page 9 of 11

Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	Soil							
<b>Batch</b>	<b>R4575591</b>							
<b>WG3007741-2 LCS</b>								
Indeno(1,2,3-cd)pyrene			90.8		%		50-140	21-MAR-19
Naphthalene			99.5		%		50-140	21-MAR-19
Phenanthrene			101.7		%		50-140	21-MAR-19
Pyrene			98.8		%		50-140	21-MAR-19
<b>WG3007741-1 MB</b>								
1-Methylnaphthalene			<0.030		ug/g		0.03	21-MAR-19
2-Methylnaphthalene			<0.030		ug/g		0.03	21-MAR-19
Acenaphthene			<0.050		ug/g		0.05	21-MAR-19
Acenaphthylene			<0.050		ug/g		0.05	21-MAR-19
Anthracene			<0.050		ug/g		0.05	21-MAR-19
Benzo(a)anthracene			<0.050		ug/g		0.05	21-MAR-19
Benzo(a)pyrene			<0.050		ug/g		0.05	21-MAR-19
Benzo(b)fluoranthene			<0.050		ug/g		0.05	21-MAR-19
Benzo(g,h,i)perylene			<0.050		ug/g		0.05	21-MAR-19
Benzo(k)fluoranthene			<0.050		ug/g		0.05	21-MAR-19
Chrysene			<0.050		ug/g		0.05	21-MAR-19
Dibenzo(ah)anthracene			<0.050		ug/g		0.05	21-MAR-19
Fluoranthene			<0.050		ug/g		0.05	21-MAR-19
Fluorene			<0.050		ug/g		0.05	21-MAR-19
Indeno(1,2,3-cd)pyrene			<0.050		ug/g		0.05	21-MAR-19
Naphthalene			<0.013		ug/g		0.013	21-MAR-19
Phenanthrene			<0.046		ug/g		0.046	21-MAR-19
Pyrene			<0.050		ug/g		0.05	21-MAR-19
Surrogate: 2-Fluorobiphenyl			71.2		%		50-140	21-MAR-19
Surrogate: p-Terphenyl d14			102.2		%		50-140	21-MAR-19
<b>WG3007741-4 MS</b>		<b>WG3007741-5</b>						
1-Methylnaphthalene			N/A	MS-B	%		-	21-MAR-19
2-Methylnaphthalene			N/A	MS-B	%		-	21-MAR-19
Acenaphthene			N/A	MS-B	%		-	21-MAR-19
Acenaphthylene			80.8		%		50-140	21-MAR-19
Anthracene			106.3		%		50-140	21-MAR-19
Benzo(a)anthracene			105.1		%		50-140	21-MAR-19
Benzo(a)pyrene			106.7		%		50-140	21-MAR-19
Benzo(b)fluoranthene			95.6		%		50-140	21-MAR-19



## Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

Page 10 of 11

Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-511-WT	Soil							
<b>Batch</b>	<b>R4575591</b>							
<b>WG3007741-4 MS</b>		<b>WG3007741-5</b>						
Benzo(g,h,i)perylene			98.8		%		50-140	21-MAR-19
Benzo(k)fluoranthene			100.8		%		50-140	21-MAR-19
Chrysene			88.3		%		50-140	21-MAR-19
Dibenzo(ah)anthracene			93.5		%		50-140	21-MAR-19
Fluoranthene			112.7		%		50-140	21-MAR-19
Fluorene			N/A	MS-B	%		-	21-MAR-19
Indeno(1,2,3-cd)pyrene			110.0		%		50-140	21-MAR-19
Naphthalene			N/A	MS-B	%		-	21-MAR-19
Phenanthrene			N/A	MS-B	%		-	21-MAR-19
Pyrene			N/A	MS-B	%		-	21-MAR-19

# Quality Control Report

Workorder: L2244494

Report Date: 22-APR-19

Client: V.A. WOOD (GUELPH)  
405 YORK ROAD  
GUELPH ON N1E 3H3  
Contact: JOHN BROAD

Page 11 of 11

## Legend:

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Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

---

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

---

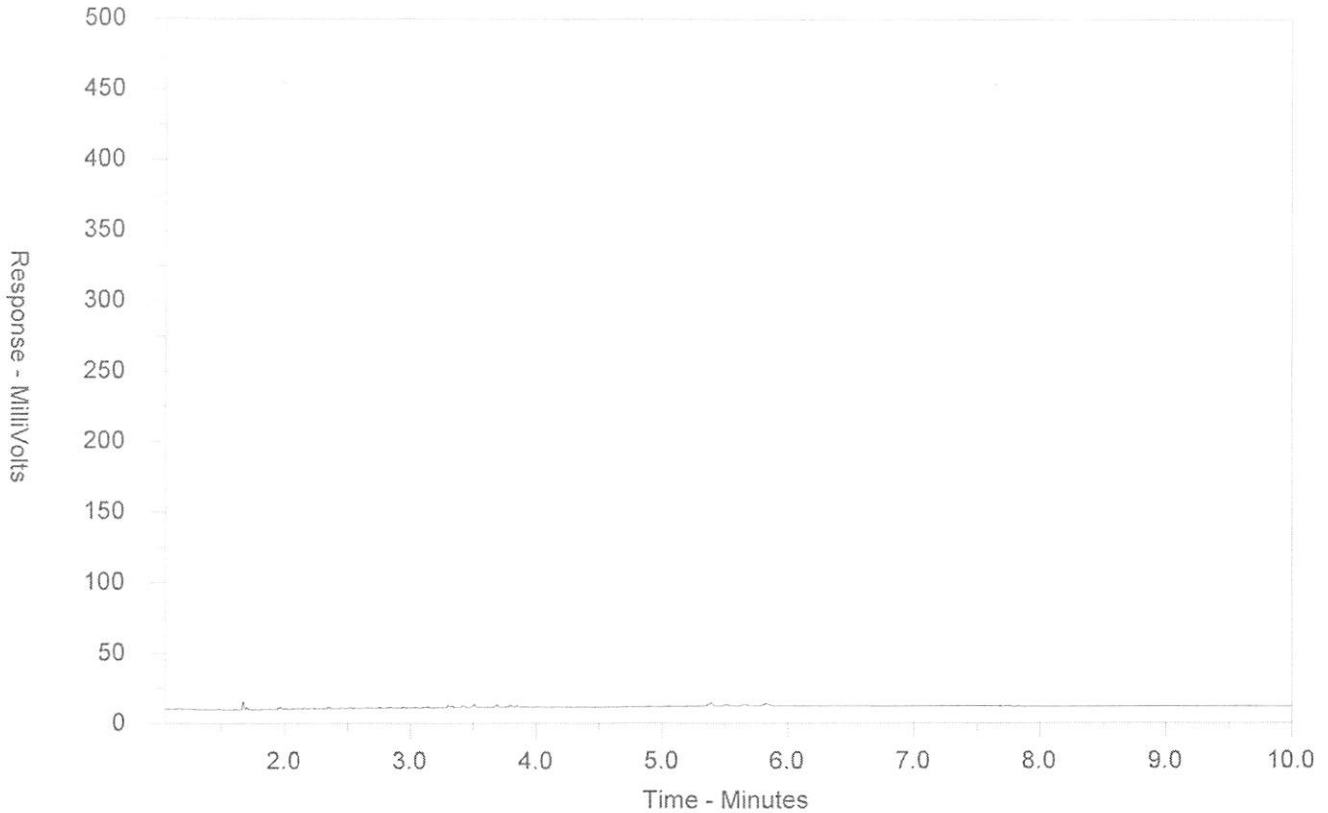
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

# CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2244494-1  
 Client Sample ID: G4091-19-3 MW1 SAM3



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
← Gasoline →			← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

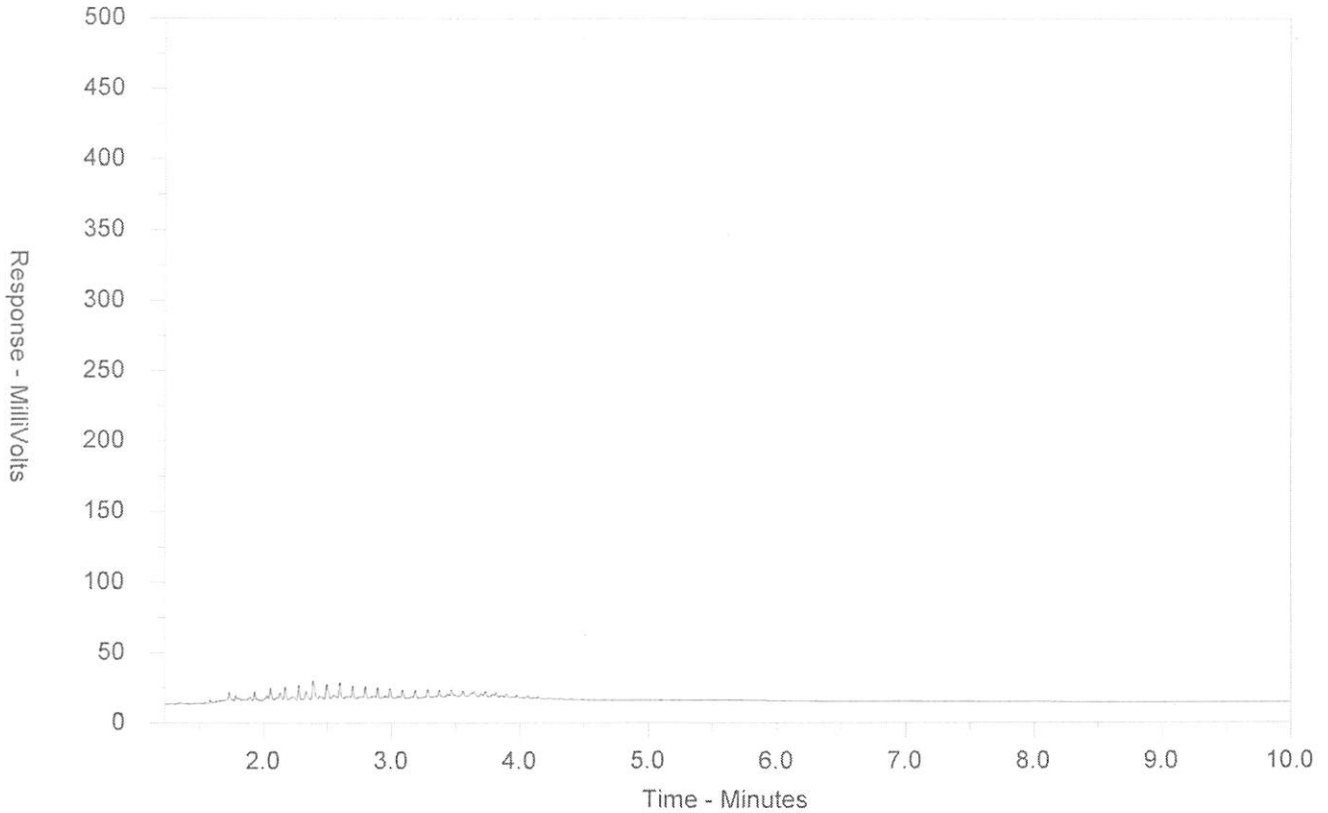
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at [www.alsglobal.com](http://www.alsglobal.com).

# CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2244494-2  
 Client Sample ID: G4091-19-3 MW2 SAM 5



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

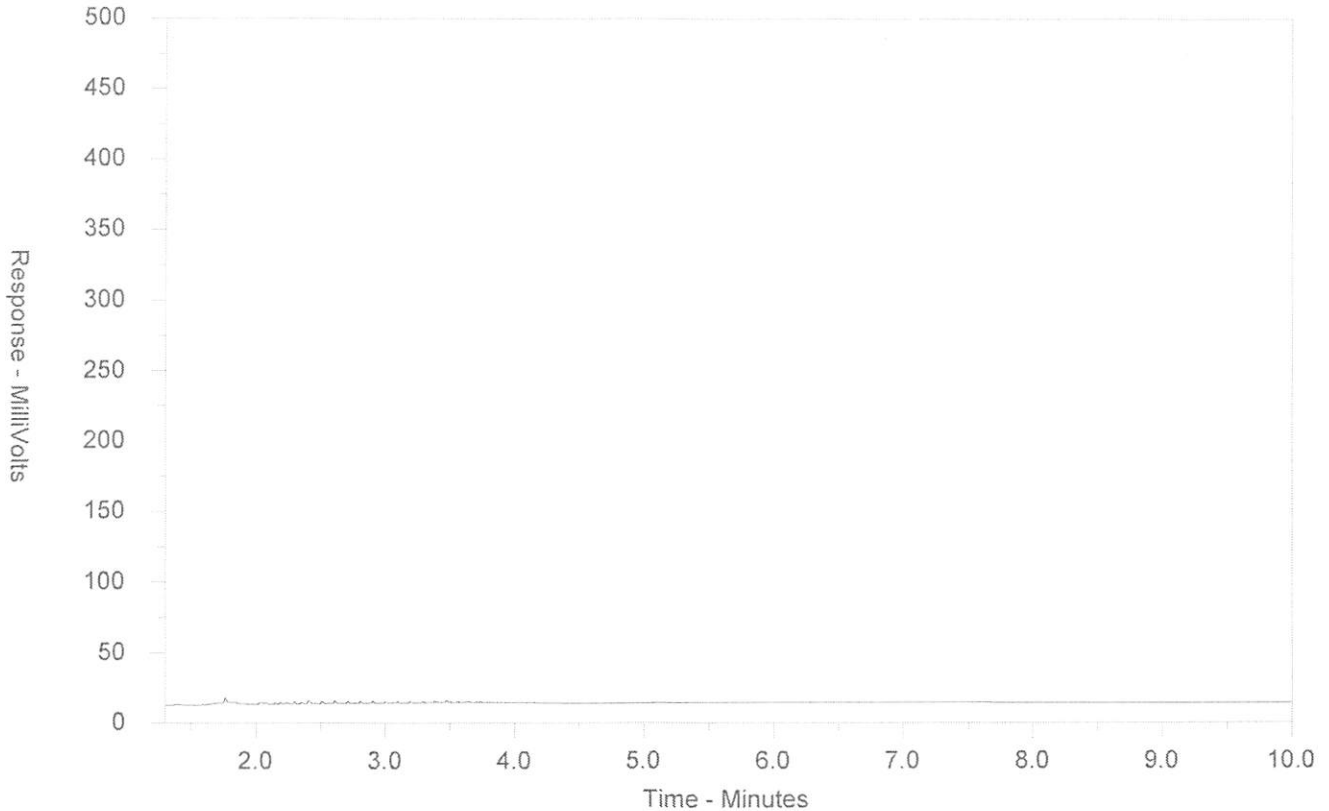
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at [www.alsglobal.com](http://www.alsglobal.com).

# CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT



ALS Sample ID: L2244494-3  
 Client Sample ID: G4091-19-3 MW3 SAM 9



← F2 →		← F3 →		← F4 →	
nC10	nC16	nC34	nC50		
174°C	287°C	481°C	575°C		
346°F	549°F	898°F	1067°F		
Gasoline →			← Motor Oils/Lube Oils/Grease		
← Diesel/Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at [www.alsglobal.com](http://www.alsglobal.com).





**Chain of Custody (COC) / Analytical Request Form**

Canada Toll Free: 1 800 668 9878



L2244494-COFC

COC Number: 17 - 641549

Page of

[www.alsglobal.com](http://www.alsglobal.com)

Report To			Report Format / Distribution			Select Service Level below - Contact your AM to confirm all E&P TATs (surcharges may apply)																																						
Contact and company name below will appear on the final report			Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular (R) <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																																						
Company: V.A. Wood (Guelph) Inc.			Quality Control (QC) Report with Report <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			EMERGENCY: <input type="checkbox"/> 4 day (P4-20%) <input type="checkbox"/> <input type="checkbox"/> 3 day (P3-25%) <input type="checkbox"/> <input type="checkbox"/> 2 day (P2-50%) <input type="checkbox"/> 1 Business day (E-100%) <input type="checkbox"/>																																						
Contact: John Broad			<input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked			Same Day, Weekend or Statutory holiday (E2-200% (Laboratory opening fees may apply) ) <input type="checkbox"/>																																						
Phone: 519-763-3101			Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm																																						
Company address below will appear on the final report			Email 1 or Fax: johab@vawoodguelph.com			For tests that can not be performed according to the service level selected, you will be contacted.																																						
Street: 405 York Rd.			Email 2:			Analysis Request																																						
City/Province: Guelph / ON			Email 3:			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below																																						
Postal Code: N1E 3M3			Invoice Distribution			<table border="1"> <tr> <td>metals</td><td>BTEX</td><td>F1</td><td>F2-F4</td><td>PAHs</td><td>SAMPLES ON HOLD</td><td>NUMBER OF CONTAINERS</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>				metals	BTEX	F1	F2-F4	PAHs	SAMPLES ON HOLD	NUMBER OF CONTAINERS																												
metals	BTEX	F1	F2-F4	PAHs	SAMPLES ON HOLD					NUMBER OF CONTAINERS																																		
Invoice To: Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																																									
Copy of Invoice with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			Email 1 or Fax: office@vawoodguelph.com																																									
Company:			Email 2:																																									
Contact:			Oil and Gas Required Fields (client use)																																									
Project Information			AFE/Cost Center: PO#																																									
ALS Account # / Quote #:			Major/Minor Code: Routing Code:																																									
Job #: G4091-19-3			Requisitioner:																																									
PO/AFE:			Location:																																									
LSD:			ALS Lab Work Order # (lab use only): L2244494 LTD.																																									
			ALS Contact:																																									
			Sampler:																																									
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																																								
1	G4091-19-3 MW1 SAM 3	14 03 19	10:30	SOIL	X	X	X	X	X																																			
2	G4091-19-3 MW2 SAM 5	14 03 19	10:30	SOIL	X	X	X	X	X																																			
3	G4091-19-3 MW3 SAM 9	14 03 19	10:30	SOIL	X	X	X	X	X																																			

Drinking Water (DW) Samples (client use)

Are samples taken from a Regulated DW System?  
 YES  NO

Are samples for human consumption/use?  
 YES  NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

**Table 1 and Table 2**

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen  SIF Observations Yes  No   
Ice Packs  Ice Cubes  Custody seal intact Yes  No   
Cooling Initiated

INITIAL COOLER TEMPERATURES °C: 11.2

FINAL COOLER TEMPERATURES °C: 11.2

SHIPMENT RELEASE (client use)

Released by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

FINAL SHIPMENT RECEPTION (lab use only)

Received by: \_\_\_\_\_ Date: **mar 14 / 2019** Time: **4:36**



V.A. WOOD (GUELPH)  
ATTN: JOHN BROAD  
405 YORK ROAD  
GUELPH ON N1E 3H3

Date Received: 19-MAR-19  
Report Date: 22-APR-19 14:35 (MT)  
Version: FINAL REV. 3

Client Phone: 519-763-3101

## Certificate of Analysis

Lab Work Order #: L2246201  
Project P.O. #: NOT SUBMITTED  
Job Reference: G4091-19-3  
C of C Numbers: 17-641551  
Legal Site Desc:

Emily Hansen  
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2246201-1	G4091-19-3 MW3, SAM 3 Sampled By: CLIENT on 13-MAR-19 @ 15:00 Matrix: SOIL									
<b>Physical Tests</b>										
	Conductivity	0.240		0.0040	mS/cm	25-MAR-19	0.47	0.57	0.7	1.4
	% Moisture	3.58		0.10	%	22-MAR-19				
	pH	8.13		0.10	pH units	24-MAR-19				
<b>Cyanides</b>										
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	22-MAR-19	0.051	0.051	0.051	0.051
<b>Saturated Paste Extractables</b>										
	SAR	0.92		0.10	SAR	25-MAR-19	1	2.4	5	12
	Calcium (Ca)	18.4		0.50	mg/L	25-MAR-19				
	Magnesium (Mg)	8.12		0.50	mg/L	25-MAR-19				
	Sodium (Na)	18.8		0.50	mg/L	25-MAR-19				
<b>Metals</b>										
	Antimony (Sb)	<1.0		1.0	ug/g	25-MAR-19	1	1.3	7.5	40
	Arsenic (As)	2.7		1.0	ug/g	25-MAR-19	11	18	18	18
	Barium (Ba)	13.4		1.0	ug/g	25-MAR-19	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	25-MAR-19	2.5	2.5	4	8
	Boron (B)	5.2		5.0	ug/g	25-MAR-19	36	36	120	120
	Boron (B), Hot Water Ext.	<0.10		0.10	ug/g	25-MAR-19	36	36	1.5	2
	Cadmium (Cd)	<0.50		0.50	ug/g	25-MAR-19	1	1.2	1.2	1.9
	Chromium (Cr)	7.2		1.0	ug/g	25-MAR-19	67	70	160	160
	Cobalt (Co)	2.3		1.0	ug/g	25-MAR-19	19	21	22	80
	Copper (Cu)	14.8		1.0	ug/g	25-MAR-19	62	92	140	230
	Lead (Pb)	14.5		1.0	ug/g	25-MAR-19	45	120	120	120
	Mercury (Hg)	<0.0050		0.0050	ug/g	25-MAR-19	0.16	0.27	0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	25-MAR-19	2	2	6.9	40
	Nickel (Ni)	4.9		1.0	ug/g	25-MAR-19	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	25-MAR-19	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	25-MAR-19	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	25-MAR-19	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	25-MAR-19	1.9	2.5	23	33
	Vanadium (V)	15.3		1.0	ug/g	25-MAR-19	86	86	86	86
	Zinc (Zn)	252		5.0	ug/g	25-MAR-19	290	290	340	340
<b>Speciated Metals</b>										
	Chromium, Hexavalent	<0.20		0.20	ug/g	22-MAR-19	0.66	0.66	8	8
L2246201-2	G4091-19-3 BH4, SAM 1 Sampled By: CLIENT on 12-MAR-19 @ 16:15 Matrix: SOIL									
<b>Physical Tests</b>										
	Conductivity	0.222		0.0040	mS/cm	25-MAR-19	0.47	0.57	0.7	1.4
	% Moisture	21.5		0.10	%	22-MAR-19				
	pH	7.30		0.10	pH units	24-MAR-19				
<b>Cyanides</b>										
	Cyanide, Weak Acid Diss	<0.050		0.050	ug/g	22-MAR-19	0.051	0.051	0.051	0.051
<b>Saturated Paste Extractables</b>										
	SAR	0.29		0.10	SAR	25-MAR-19	1	2.4	5	12

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

**Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C**

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

# ANALYTICAL GUIDELINE REPORT

G4091-19-3

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L2246201-2 G4091-19-3 BH4, SAM 1										
Sampled By: CLIENT on 12-MAR-19 @ 16:15										
Matrix: SOIL										
<b>Saturated Paste Extractables</b>										
	Calcium (Ca)	33.8		0.50	mg/L	25-MAR-19				
	Magnesium (Mg)	5.50		0.50	mg/L	25-MAR-19				
	Sodium (Na)	6.95		0.50	mg/L	25-MAR-19				
<b>Metals</b>										
	Antimony (Sb)	<1.0		1.0	ug/g	25-MAR-19	1	1.3	7.5	40
	Arsenic (As)	8.7		1.0	ug/g	25-MAR-19	11	18	18	18
	Barium (Ba)	70.5		1.0	ug/g	25-MAR-19	210	220	390	670
	Beryllium (Be)	<0.50		0.50	ug/g	25-MAR-19	2.5	2.5	4	8
	Boron (B)	5.8		5.0	ug/g	25-MAR-19	36	36	120	120
	Boron (B), Hot Water Ext.	0.55		0.10	ug/g	25-MAR-19	36	36	1.5	2
	Cadmium (Cd)	0.62		0.50	ug/g	25-MAR-19	1	1.2	1.2	1.9
	Chromium (Cr)	15.5		1.0	ug/g	25-MAR-19	67	70	160	160
	Cobalt (Co)	5.5		1.0	ug/g	25-MAR-19	19	21	22	80
	Copper (Cu)	24.6		1.0	ug/g	25-MAR-19	62	92	140	230
	Lead (Pb)	80.4		1.0	ug/g	25-MAR-19	*45	120	120	120
	Mercury (Hg)	0.686		0.0050	ug/g	25-MAR-19	*0.16	*0.27	*0.27	3.9
	Molybdenum (Mo)	<1.0		1.0	ug/g	25-MAR-19	2	2	6.9	40
	Nickel (Ni)	10.5		1.0	ug/g	25-MAR-19	37	82	100	270
	Selenium (Se)	<1.0		1.0	ug/g	25-MAR-19	1.2	1.5	2.4	5.5
	Silver (Ag)	<0.20		0.20	ug/g	25-MAR-19	0.5	0.5	20	40
	Thallium (Tl)	<0.50		0.50	ug/g	25-MAR-19	1	1	1	3.3
	Uranium (U)	<1.0		1.0	ug/g	25-MAR-19	1.9	2.5	23	33
	Vanadium (V)	30.3		1.0	ug/g	25-MAR-19	86	86	86	86
	Zinc (Zn)	183		5.0	ug/g	25-MAR-19	290	290	340	340
<b>Speciated Metals</b>										
	Chromium, Hexavalent	<0.20		0.20	ug/g	22-MAR-19	0.66	0.66	8	8

\*\* Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

\* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

**Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T1/T2-SOIL-RPIICC-C**

#1: T1-Soil-Agricultural or Other Property Use

#2: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Ind/Com/Commu Property Use (Coarse)

## Reference Information

## Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B
<p>A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 450CN I-WAD
<p>The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
CR-CR6-IC-WT	Soil	Hexavalent Chromium in Soil	SW846 3060A/7199
<p>This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
EC-WT	Soil	Conductivity (EC)	MOEE E3138
<p>A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
HG-200.2-CVAA-WT	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
<p>Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
<p>Soil/sediment is dried, disaggregated, and sieved (2 mm). For tests intended to support Ontario regulations, the &lt;2mm fraction is ground to pass through a 0.355 mm sieve. Strong Acid Leachable Metals in the &lt;2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.</p> <p>Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H<sub>2</sub>S) may be excluded if lost during sampling, storage, or digestion.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).</p>			
MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PH-WT	Soil	pH	MOEE E3137A
<p>A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			
SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C
<p>A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.</p> <p>Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).</p>			



## Reference Information

\*\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

17-641551

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

#### GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample  
 mg/kg wwt - milligrams per kilogram based on wet weight of sample  
 mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight  
 mg/L - unit of concentration based on volume, parts per million.  
 < - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.  
 UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Environmental

### Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

Page 1 of 6

Client: V.A. WOOD (GUELPH)  
405 YORK ROAD  
GUELPH ON N1E 3H3  
Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT		Soil						
Batch R4581096								
WG3013226-4	DUP	L2246269-1						
	Boron (B), Hot Water Ext.	0.24	0.22		ug/g	9.0	30	25-MAR-19
WG3013226-2	IRM	HOTB-SAL_SOIL5						
	Boron (B), Hot Water Ext.		94.8		%		70-130	25-MAR-19
WG3013226-3	LCS							
	Boron (B), Hot Water Ext.		100.2		%		70-130	25-MAR-19
WG3013226-1	MB							
	Boron (B), Hot Water Ext.		<0.10		ug/g		0.1	25-MAR-19
CN-WAD-R511-WT		Soil						
Batch R4580571								
WG3011187-3	DUP	L2245548-2						
	Cyanide, Weak Acid Diss	N/A	<0.050	RPD-NA	ug/g	N/A	35	22-MAR-19
WG3011187-2	LCS							
	Cyanide, Weak Acid Diss		98.3		%		80-120	22-MAR-19
WG3011187-1	MB							
	Cyanide, Weak Acid Diss		<0.050		ug/g		0.05	22-MAR-19
WG3011187-4	MS	L2245548-2						
	Cyanide, Weak Acid Diss		98.0		%		70-130	22-MAR-19
CR-CR6-IC-WT		Soil						
Batch R4580508								
WG3011371-4	CRM	WT-SQC012						
	Chromium, Hexavalent		90.5		%		70-130	22-MAR-19
WG3011371-3	DUP	L2246362-2						
	Chromium, Hexavalent	<0.20	<0.20	RPD-NA	ug/g	N/A	35	22-MAR-19
WG3011371-2	LCS							
	Chromium, Hexavalent		97.2		%		80-120	22-MAR-19
WG3011371-1	MB							
	Chromium, Hexavalent		<0.20		ug/g		0.2	22-MAR-19
EC-WT		Soil						
Batch R4581535								
WG3013231-9	DUP	WG3013231-8						
	Conductivity	0.435	0.426		mS/cm	2.1	20	25-MAR-19
WG3013231-7	IRM	WT SAR2						
	Conductivity		103.9		%		70-130	25-MAR-19
WG3013364-1	LCS							
	Conductivity		102.3		%		90-110	25-MAR-19
WG3013231-6	MB							



## Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	Soil							
<b>Batch</b>	<b>R4581535</b>							
<b>WG3013231-6</b>	<b>MB</b>							
Conductivity			<0.0040		mS/cm		0.004	25-MAR-19
HG-200.2-CVAA-WT	Soil							
<b>Batch</b>	<b>R4581415</b>							
<b>WG3013223-2</b>	<b>CRM</b>	<b>WT-CANMET-TILL1</b>						
Mercury (Hg)			101.1		%		70-130	25-MAR-19
<b>WG3013223-6</b>	<b>DUP</b>	<b>WG3013223-5</b>						
Mercury (Hg)		0.0153	0.0161		ug/g	4.8	40	25-MAR-19
<b>WG3013223-3</b>	<b>LCS</b>							
Mercury (Hg)			101.0		%		80-120	25-MAR-19
<b>WG3013223-1</b>	<b>MB</b>							
Mercury (Hg)			<0.0050		mg/kg		0.005	25-MAR-19
MET-200.2-CCMS-WT	Soil							
<b>Batch</b>	<b>R4581588</b>							
<b>WG3013223-2</b>	<b>CRM</b>	<b>WT-CANMET-TILL1</b>						
Antimony (Sb)			113.3		%		70-130	25-MAR-19
Arsenic (As)			116.5		%		70-130	25-MAR-19
Barium (Ba)			120.2		%		70-130	25-MAR-19
Beryllium (Be)			110.8		%		70-130	25-MAR-19
Boron (B)			2.9		mg/kg		0-8.2	25-MAR-19
Cadmium (Cd)			111.4		%		70-130	25-MAR-19
Chromium (Cr)			115.0		%		70-130	25-MAR-19
Cobalt (Co)			115.1		%		70-130	25-MAR-19
Copper (Cu)			116.8		%		70-130	25-MAR-19
Lead (Pb)			113.4		%		70-130	25-MAR-19
Molybdenum (Mo)			116.4		%		70-130	25-MAR-19
Nickel (Ni)			115.3		%		70-130	25-MAR-19
Selenium (Se)			0.37		mg/kg		0.11-0.51	25-MAR-19
Silver (Ag)			0.26		mg/kg		0.13-0.33	25-MAR-19
Thallium (Tl)			0.136		mg/kg		0.077-0.18	25-MAR-19
Uranium (U)			108.0		%		70-130	25-MAR-19
Vanadium (V)			116.4		%		70-130	25-MAR-19
Zinc (Zn)			109.3		%		70-130	25-MAR-19
<b>WG3013223-6</b>	<b>DUP</b>	<b>WG3013223-5</b>						
Antimony (Sb)		0.23	0.23		ug/g	0.1	30	25-MAR-19





## Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
<b>Batch R4581588</b>								
<b>WG3013223-6 DUP</b>		<b>WG3013223-5</b>						
Arsenic (As)		9.16	9.68		ug/g	5.5	30	25-MAR-19
Barium (Ba)		114	123		ug/g	7.7	40	25-MAR-19
Beryllium (Be)		0.63	0.66		ug/g	4.1	30	25-MAR-19
Boron (B)		8.8	9.8		ug/g	10	30	25-MAR-19
Cadmium (Cd)		0.081	0.078		ug/g	3.4	30	25-MAR-19
Chromium (Cr)		19.9	21.1		ug/g	6.0	30	25-MAR-19
Cobalt (Co)		13.9	14.5		ug/g	4.4	30	25-MAR-19
Copper (Cu)		59.0	61.3		ug/g	3.8	30	25-MAR-19
Lead (Pb)		13.3	13.4		ug/g	0.7	40	25-MAR-19
Molybdenum (Mo)		0.47	0.51		ug/g	7.2	40	25-MAR-19
Nickel (Ni)		26.2	27.6		ug/g	5.2	30	25-MAR-19
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	25-MAR-19
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	25-MAR-19
Thallium (Tl)		0.116	0.121		ug/g	3.7	30	25-MAR-19
Uranium (U)		0.518	0.530		ug/g	2.3	30	25-MAR-19
Vanadium (V)		28.1	30.0		ug/g	6.4	30	25-MAR-19
Zinc (Zn)		66.2	69.7		ug/g	5.2	30	25-MAR-19
<b>WG3013223-4 LCS</b>								
Antimony (Sb)			104.1		%		80-120	25-MAR-19
Arsenic (As)			98.1		%		80-120	25-MAR-19
Barium (Ba)			101.0		%		80-120	25-MAR-19
Beryllium (Be)			91.8		%		80-120	25-MAR-19
Boron (B)			84.9		%		80-120	25-MAR-19
Cadmium (Cd)			96.5		%		80-120	25-MAR-19
Chromium (Cr)			94.6		%		80-120	25-MAR-19
Cobalt (Co)			95.9		%		80-120	25-MAR-19
Copper (Cu)			93.7		%		80-120	25-MAR-19
Lead (Pb)			97.9		%		80-120	25-MAR-19
Molybdenum (Mo)			100.6		%		80-120	25-MAR-19
Nickel (Ni)			94.3		%		80-120	25-MAR-19
Selenium (Se)			96.7		%		80-120	25-MAR-19
Silver (Ag)			98.8		%		80-120	25-MAR-19
Thallium (Tl)			97.7		%		80-120	25-MAR-19



## Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT								
	Soil							
<b>Batch</b>	<b>R4581588</b>							
<b>WG3013223-4</b>	<b>LCS</b>							
Uranium (U)			92.4		%		80-120	25-MAR-19
Vanadium (V)			99.7		%		80-120	25-MAR-19
Zinc (Zn)			90.9		%		80-120	25-MAR-19
<b>WG3013223-1</b>	<b>MB</b>							
Antimony (Sb)			<0.10		mg/kg		0.1	25-MAR-19
Arsenic (As)			<0.10		mg/kg		0.1	25-MAR-19
Barium (Ba)			<0.50		mg/kg		0.5	25-MAR-19
Beryllium (Be)			<0.10		mg/kg		0.1	25-MAR-19
Boron (B)			<5.0		mg/kg		5	25-MAR-19
Cadmium (Cd)			<0.020		mg/kg		0.02	25-MAR-19
Chromium (Cr)			<0.50		mg/kg		0.5	25-MAR-19
Cobalt (Co)			<0.10		mg/kg		0.1	25-MAR-19
Copper (Cu)			<0.50		mg/kg		0.5	25-MAR-19
Lead (Pb)			<0.50		mg/kg		0.5	25-MAR-19
Molybdenum (Mo)			<0.10		mg/kg		0.1	25-MAR-19
Nickel (Ni)			<0.50		mg/kg		0.5	25-MAR-19
Selenium (Se)			<0.20		mg/kg		0.2	25-MAR-19
Silver (Ag)			<0.10		mg/kg		0.1	25-MAR-19
Thallium (Tl)			<0.050		mg/kg		0.05	25-MAR-19
Uranium (U)			<0.050		mg/kg		0.05	25-MAR-19
Vanadium (V)			<0.20		mg/kg		0.2	25-MAR-19
Zinc (Zn)			<2.0		mg/kg		2	25-MAR-19
MOISTURE-WT								
	Soil							
<b>Batch</b>	<b>R4577930</b>							
<b>WG3011223-3</b>	<b>DUP</b>	<b>L2246205-2</b>						
% Moisture		34.6	34.0		%	1.8	20	22-MAR-19
<b>WG3011223-2</b>	<b>LCS</b>							
% Moisture			100.3		%		90-110	22-MAR-19
<b>WG3011223-1</b>	<b>MB</b>							
% Moisture			<0.10		%		0.1	22-MAR-19
PH-WT								
	Soil							
<b>Batch</b>	<b>R4580399</b>							
<b>WG3011289-1</b>	<b>DUP</b>	<b>L2246195-1</b>						
pH		7.77	7.82	J	pH units	0.05	0.3	24-MAR-19
<b>WG3012846-1</b>	<b>LCS</b>							



## Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

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Client: V.A. WOOD (GUELPH)  
 405 YORK ROAD  
 GUELPH ON N1E 3H3  
 Contact: JOHN BROAD

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Soil							
Batch	R4580399							
WG3012846-1	LCS							
pH			6.98		pH units		6.9-7.1	24-MAR-19
SAR-R511-WT	Soil							
Batch	R4581423							
WG3013231-9	DUP	WG3013231-8						
Calcium (Ca)		25.9	25.4		mg/L	1.9	30	25-MAR-19
Sodium (Na)		17.0	17.3		mg/L	1.7	30	25-MAR-19
Magnesium (Mg)		10.5	10.3		mg/L	1.9	30	25-MAR-19
WG3013231-7	IRM	WT SAR2						
Calcium (Ca)			109.5		%		70-130	25-MAR-19
Sodium (Na)			95.5		%		70-130	25-MAR-19
Magnesium (Mg)			107.9		%		70-130	25-MAR-19
WG3013231-10	LCS							
Calcium (Ca)			109.0		%		70-130	25-MAR-19
Sodium (Na)			103.6		%		70-130	25-MAR-19
Magnesium (Mg)			104.8		%		70-130	25-MAR-19
WG3013231-6	MB							
Calcium (Ca)			<0.50		mg/L		0.5	25-MAR-19
Sodium (Na)			<0.50		mg/L		0.5	25-MAR-19
Magnesium (Mg)			<0.50		mg/L		0.5	25-MAR-19

# Quality Control Report

Workorder: L2246201

Report Date: 22-APR-19

Client: V.A. WOOD (GUELPH)  
405 YORK ROAD  
GUELPH ON N1E 3H3  
Contact: JOHN BROAD

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## Legend:

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Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

---

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

---

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



# Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 688 9878



L2246201-COFC

COC Number: 17 - 641551

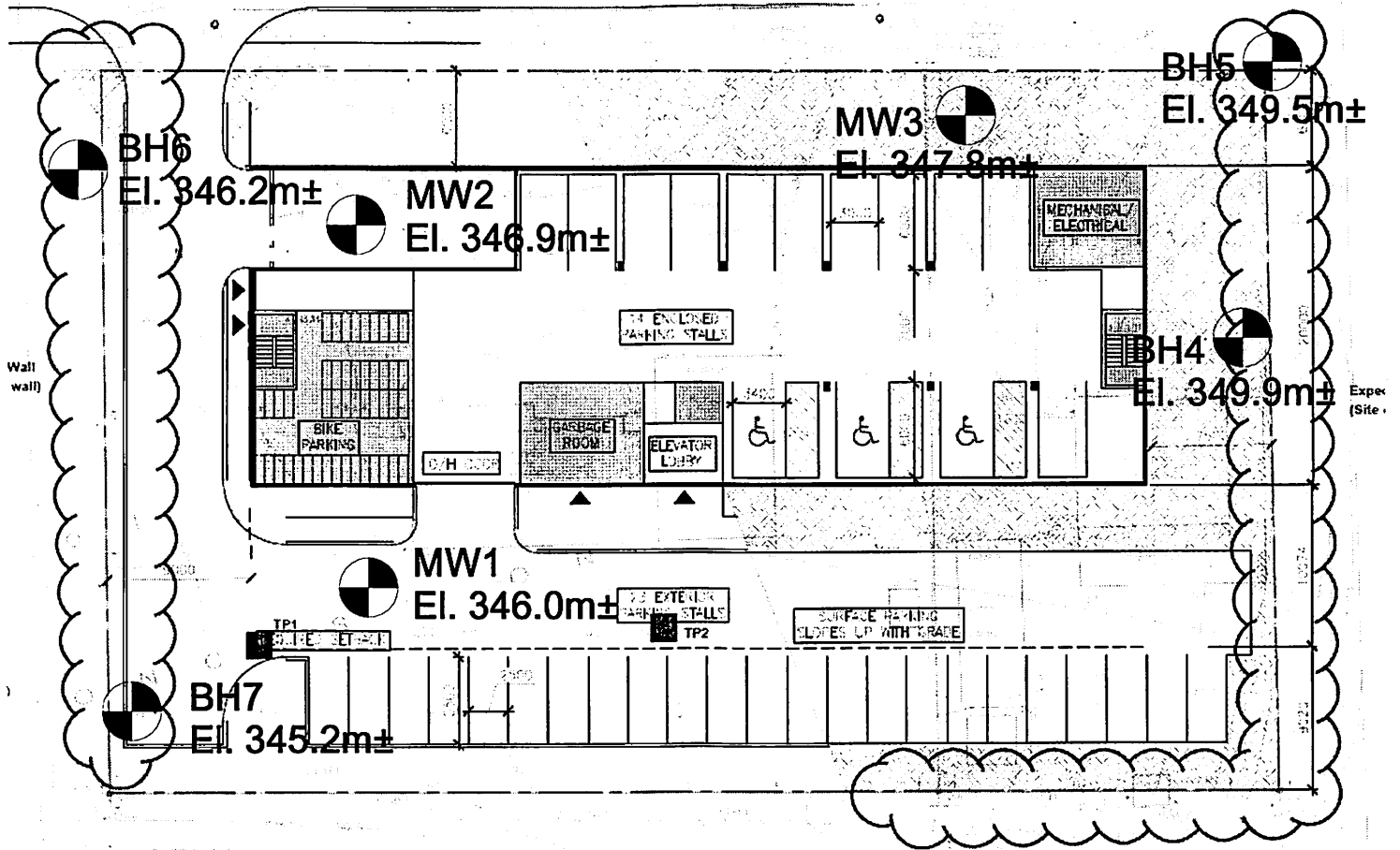
Page of

<b>Report To</b> Contact and company name below will appear on the final report			<b>Report Format / Distribution</b>			<b>Select Service Level - Contact your AM to confirm all E&amp;P TATs (surcharges may apply)</b>																																																																																																																																																																																																														
Company: <b>VA Wood (Guelph) Inc</b>			Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			Regular <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply																																																																																																																																																																																																														
Contact: <b>John Broad</b>			Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO			Priority (Business Day)	4 day [P4-20%] <input type="checkbox"/>						EMERGENCY	1 Business day [E-100%] <input type="checkbox"/>																																																																																																																																																																																																						
Phone: <b>519-763-3101</b>			<input checked="" type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked				3 day [P3-25%] <input type="checkbox"/>							Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] <input type="checkbox"/>																																																																																																																																																																																																						
Company address below will appear on the final report			Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX				2 day [P2-50%] <input type="checkbox"/>																																																																																																																																																																																																													
Street:			Email 1 or Fax: <b>johnb@vawoodguelph.com</b>			Data and Time Required for all E&P TATs:						dd-mmm-yy hh:mm																																																																																																																																																																																																								
City/Province:			Email 2:			For tests that can not be performed according to the service level selected, you will be contacted.																																																																																																																																																																																																														
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Invoice To: Same as Report To <input type="checkbox"/> YES <input type="checkbox"/> NO			<b>Invoice Distribution</b>			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (FP) below																																																																																																																																																																																																														
Copy of Invoice with Report <input type="checkbox"/> YES <input type="checkbox"/> NO			Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">metals + inorganics</div> <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">SAMPLES ON HOLD</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Sample is hazardous (please provide further details)</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">NUMBER OF CONTAINERS</div> </div>																																																																																																																																																																																																														
Company:			Email 1 or Fax: <b>office@vawoodguelph.com</b>			Project Information																																																																																																																																																																																																														
Contact:			Email 2:			Oil and Gas Required Fields (client use)																																																																																																																																																																																																														
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ALS Lab Work Order # (lab use only): <b>L2246201</b>			ALS Contact:			Sampler:																																																																																																																																																																																																														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)				Date (dd-mmm-yy)	Time (hh:mm)	Sample Type																																																																																																																																																																																																													
	<b>G4091-19-3 MW 3, SAM 3</b>				<b>03-Mar-19</b>	<b>15:00</b>	<b>SOIL</b>	X																																																																																																																																																																																																												
	<b>G4091-19-3 BH 4, SAM 1</b>				<b>12-Mar-19</b>	<b>16:15</b>	<b>SOIL</b>	X																																																																																																																																																																																																												
Drinking Water (DW) Samples (client use)			Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			<b>SAMPLE CONDITION AS RECEIVED (lab use only)</b>																																																																																																																																																																																																														
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input type="checkbox"/> NO			<b>Table 1 and Table 2</b>			Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>						Ice Packs <input type="checkbox"/> Ice Cubes <input checked="" type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																																																																								
Are samples for human consumption/ use? <input type="checkbox"/> YES <input type="checkbox"/> NO						Cooling Infiltrated <input type="checkbox"/>																																																																																																																																																																																																														
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<b>SHIPMENT RELEASE (client use)</b>			<b>INITIAL SHIPMENT RECEPTION (lab use only)</b>						<b>FINAL SHIPMENT RECEPTION (lab use only)</b>																																																																																																																																																																																																											
Released by: <b>DH</b>	Date: <b>Mar 19, 2019</b>	Time:	Received by: <b>RK</b>	Date: <b>3-19-19</b>	Time: <b>16:15</b>	Received by: <b>N</b>	Date: <b>Mar 19/19</b>	Time: <b>14:15</b>																																																																																																																																																																																																												

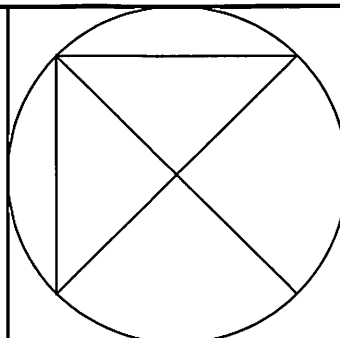
REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION  
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form, the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

ALS 01/17/2007

**ENCLOSURES**



Benchmark: MW1 - MW3 Elevations supplied by GMBP, BH4 - BH7 Ground elevation @ MW2 El. 346.9m



**V.A. WOOD (GUELPH) INC.**  
 Consulting Geotechnical Engineers

405 York Road, Guelph, Ontario N1E 3H3  
 Ph. (519) 763-3101 Fax. (519) 763-5912

**Borehole Location Plan**  
 1871 & 1879 Gordon Street  
 City of Guelph, Ontario

Scale: NTS

Ref. No. G4091-19-6

Date: June 5, 2019

Enclosure 1

REFERENCE No: G4091-19-3

**MONITORING WELL No: 1**

CLIENT: Mar-Cot Investments

**V.A. WOOD (GUELPH) INC.**  
**CONSULTING GEOTECHNICAL ENGINEERS**

PROJECT: Geotechnical Investigation

ENCLOSURE No: 2

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	EAGLE TOV (ppm)
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	346.0								
0.3	275mm Topsoil	345.7			1	SS	9			0
1.7	dark brown, compact Sand and Gravel FILL trace organics, moist	344.3	[Cross-hatched symbol]		1	SS	10			0
					2	SS	19			0
					3	SS	16			0
2.3	dark brown, very stiff Silty Clay FILL moist	343.7			4	SS	50	250m		0
	brown, compact to very dense GRAVEL AND SAND trace silt, moist		[Gravel and Sand symbol]		5	SS	50	175mm		0
					6	SS	38			0
					7	SS	30			0
					8	SS	45			0
				9	SS	38			0	

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 150mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: March 14, 2019

SHEET: 1 of 2



REFERENCE No: G4091-19-3

**MONITORING WELL No: 1**

CLIENT: Mar-Cot Investments

**V.A. WOOD (GUELPH) INC.**  
**CONSULTING GEOTECHNICAL ENGINEERS**

PROJECT: Geotechnical Investigation

ENCLOSURE No: 2

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	EAGLE TOV (ppm)				
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE				5	10	15	20
12.2		333.8			10	SS	22							0
12.5	brown, compact SAND moist	333.5			11	SS	26							0
	brown, compact SILTY SAND moist				12	SS	50	~150mm						0
	brown, dense to very dense GRAVEL AND SAND trace silt, moist to wet				13	SS	41							0
18.3		327.7			14	SS	32							0
18.7	grey, very loose SAND AND SILT TILL some clay, trace gravel, saturated	327.3			15	SS	HW							0
	End of Borehole													

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 150mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: March 14, 2019

SHEET: 2 of 2

REFERENCE No: G4091-19-3

**MONITORING WELL No: 2**

CLIENT: Mar-Cot Investments

**V.A. WOOD (GUELPH) INC.**  
**CONSULTING GEOTECHNICAL ENGINEERS**

PROJECT: Geotechnical Investigation

ENCLOSURE No: 3

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					EAGLE TOV (ppm)				
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20	40	60	80	5	10	15	20	25					
0.0	Ground Surface	346.9																			
0.3	250mm Topsoil	346.6			1	SS	9												0		
1.5	dark brown, very loose Silty Sand and Gravel FILL moist	345.4	[Cross-hatched symbol]		2	SS	4												0		
					3	SS	16											0			
					4	SS	23													0	
9.6	brown, compact to very dense GRAVEL AND SAND trace silt, moist  SAND seam @ 6.1m	337.3	[Gravel and Sand symbol]		5	SS	50												0		
					6	SS	41												0		
					7	SS	38													0	
					8	SS	50														0
					9	SS	50														
	End of Borehole																				

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 150mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: March 13, 2019

SHEET: 1 of 1

REFERENCE No: G4091-19-3

**MONITORING WELL No: 3**

CLIENT: Mar-Cot Developments Inc.

**V.A. WOOD (GUELPH) INC.**  
**CONSULTING GEOTECHNICAL ENGINEERS**

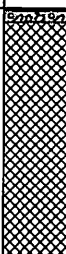
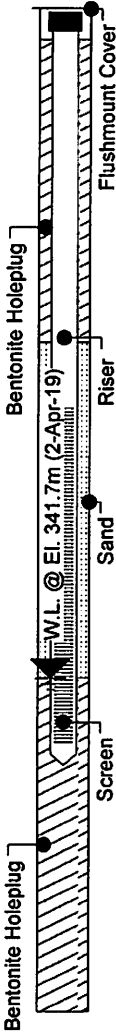

PROJECT: Geotechnical Investigation

ENCLOSURE No: 4

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE				SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	EAGLE TOV (ppm)	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE				N-VALUE
0.0	Ground Surface	347.8								
0.0 - 2.3	25mm Asphalt 100mm Granular Base brown, compact to dense Sand and Gravel FILL moist	345.5			1	AS	-			0
	2				SS	20			0	
2.3 - 9.6	brown, compact to very dense GRAVEL AND SAND trace silt, moist	338.2			3	SS	43			0
	4				SS	26			0	
9.6 - 10.0	End of Borehole				5	SS	26			0
					6	SS	38			0
10.0 - 10.5					7	SS	50	250mm		0
					8	SS	50	225mm		0
10.5 - 11.0					9	SS	50	175mm		0

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 150mm

DRILL METHOD: Hollow Stem Augers

DATUM: Geodetic

DRILL DATE: March 13, 2019

SHEET: 1 of 1

REFERENCE No: G4091-19-3

**BOREHOLE No: 4**

CLIENT: Mar-Cot Developments Inc.

**V.A. WOOD (GUELPH) INC.**  
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Geotechnical Investigation

ENCLOSURE No: 5

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25	
								0.0	Ground Surface	349.9							
0.3	250mm Topsoil	349.6			1	SS	12										
1.5	brown, compact to dense Silty Sand and Gravel FILL moist	348.4		DRY (12-Mar-19)	1	SS	20										
					2	SS	42										
					3	SS	50										
3.5	brown, dense to very dense GRAVEL AND SAND trace silt, moist	346.4			4	SS	50										
					5	SS	49										
	End of Borehole																

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 110mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: March 12, 2019

SHEET: 1 of 1

REFERENCE No: G4091-19-3

**BOREHOLE No: 5**

CLIENT: Mar-Cot Developments Inc.

**V.A. WOOD (GUELPH) INC.**  
**CONSULTING GEOTECHNICAL ENGINEERS**

PROJECT: Geotechnical Investigation

ENCLOSURE No: 6

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT		
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	N <sup>o</sup> BLOWS/0.3m	20	40	60	80	5	10	15	20	25			
								0.0	Ground Surface	349.5									
0.1	150mm Topsoil	349.3																	
0.3	brown, dense Sand and Gravel FILL frozen	349.2			1	SS	21												
	brown, compact to very dense GRAVEL AND SAND trace silt, moist			DRY (12-Mar-19)	1	SS	37												
					2	SS	25												
						3	SS	50					200mm						
						4	SS	50					100mm						
						5	SS	50					175mm						
3.5		346.0																	
	End of Borehole																		

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 110mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: March 12, 2019

SHEET: 1 of 1

REFERENCE No: G4091-19-3

**BOREHOLE No: 6**

CLIENT: Mar-Cot Developments Inc.

**V.A. WOOD (GUELPH) INC.**  
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Geotechnical Investigation

ENCLOSURE No: 7

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT				
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25					
0.0	Ground Surface	346.2																			
0.2	225mm Topsoil	346.0			1	SS	21														
	brown, compact to dense GRAVEL AND SAND trace silt moist			DRY (12-Mar-19)																	
					1	SS	24														
					2	SS	47														
					3	SS	31														
					4	SS	45														
3.5		342.7			5	SS	40														
	End of Borehole																				

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 110mm

DRILL METHOD: Solid Stem Augers

DATUM: Geodetic

DRILL DATE: March 12, 2019

SHEET: 1 of 1

REFERENCE No: G4091-19-3

BOREHOLE No: 7

CLIENT: Mar-Col Developments Inc.

**V.A. WOOD (GUELPH) INC.**  
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Geotechnical Investigation

ENCLOSURE No: 8

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3  
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: 1871 & 1879 Gordon St, Guelph, ON

SUPERVISOR: B.A.

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE BLOWS/0.3m				WATER CONTENT %					UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' BLOWS/0.3m	20	40	60	80	5	10	15	20	25	
0.0	Ground Surface	345.2															
0.3	325mm Topsoil	344.8			1	SS	18	○									
	dark brown, compact to dense Silty Sand FILL moist			DRY (12-Mar-19)	1	SS	18	○									
					2	SS	47		○								
					3	SS	12	○									
					4	SS	23	○									
3.0		342.1															
3.5	brown, dense GRAVEL AND SAND trace silt, moist	341.7			5	SS	42		○								
	End of Borehole																

DRILLED BY: London Soil Tests Ltd.

HOLE DIAMETER: 110mm

DRILL METHOD: Solid Stem Augers

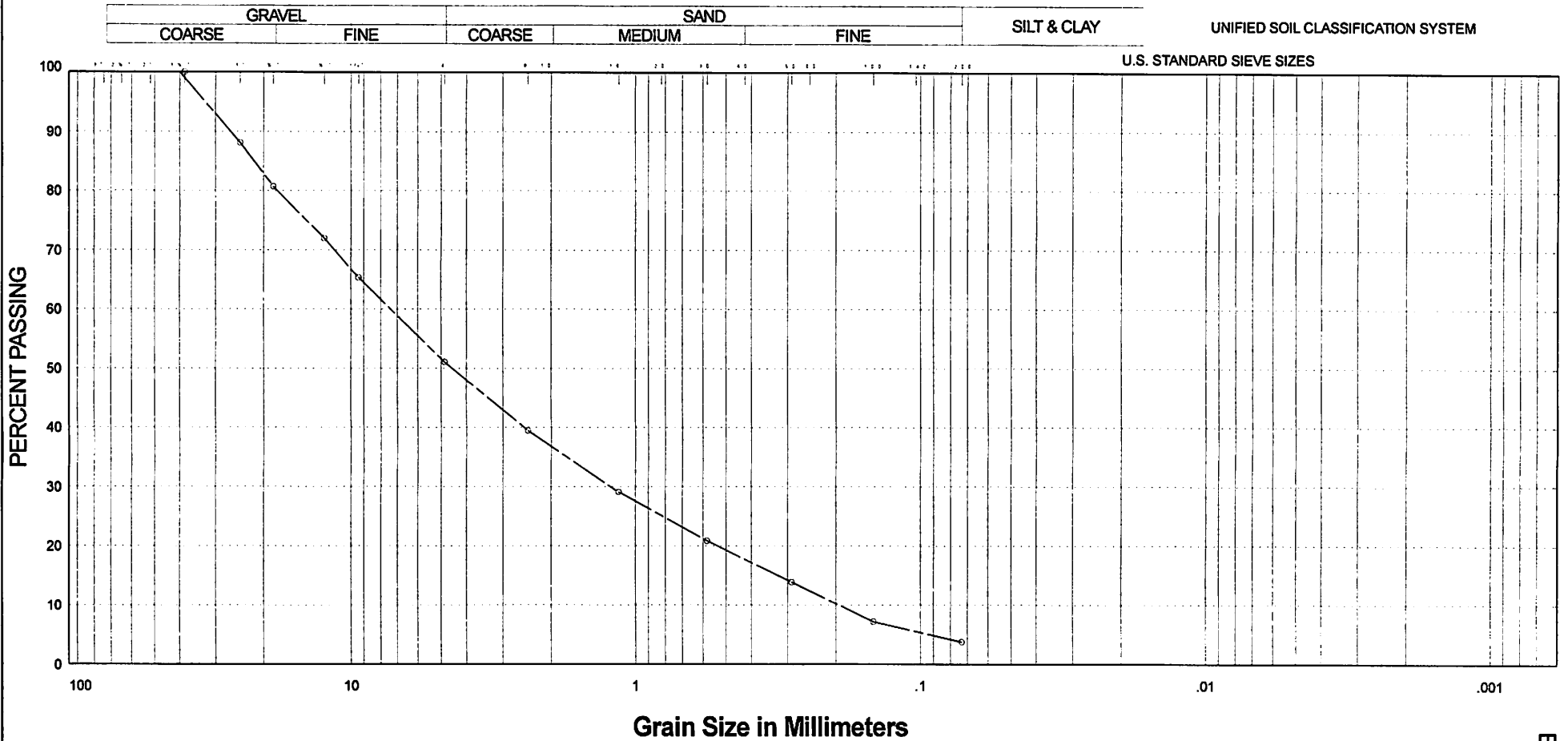
DATUM: Geodetic

DRILL DATE: March 12, 2019

SHEET: 1 of 1

# GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4091-19-3



PROJECT: Proposed Residential Development  
 LOCATION: 1871 & 1879 Gordon St., Guelph, ON  
 BOREHOLE N°: 3  
 SAMPLE N°: 3  
 DEPTH: 1.5 - 1.9m±  
 ELEVATION: 344.7 - 344.2m±

COEFFICIENT OF UNIFORMITY:  
 COEFFICIENT OF CURVATURE:

PLASTIC PROPERTIES  
 LIQUID LIMIT           % = -  
 PLASTIC LIMIT         % = -  
 PLASTICITY INDEX     % = -  
 MOISTURE CONTENT    % = 3.7

**Classification of Sample and Group Symbol:**  
 GRAVEL AND SAND, trace silt

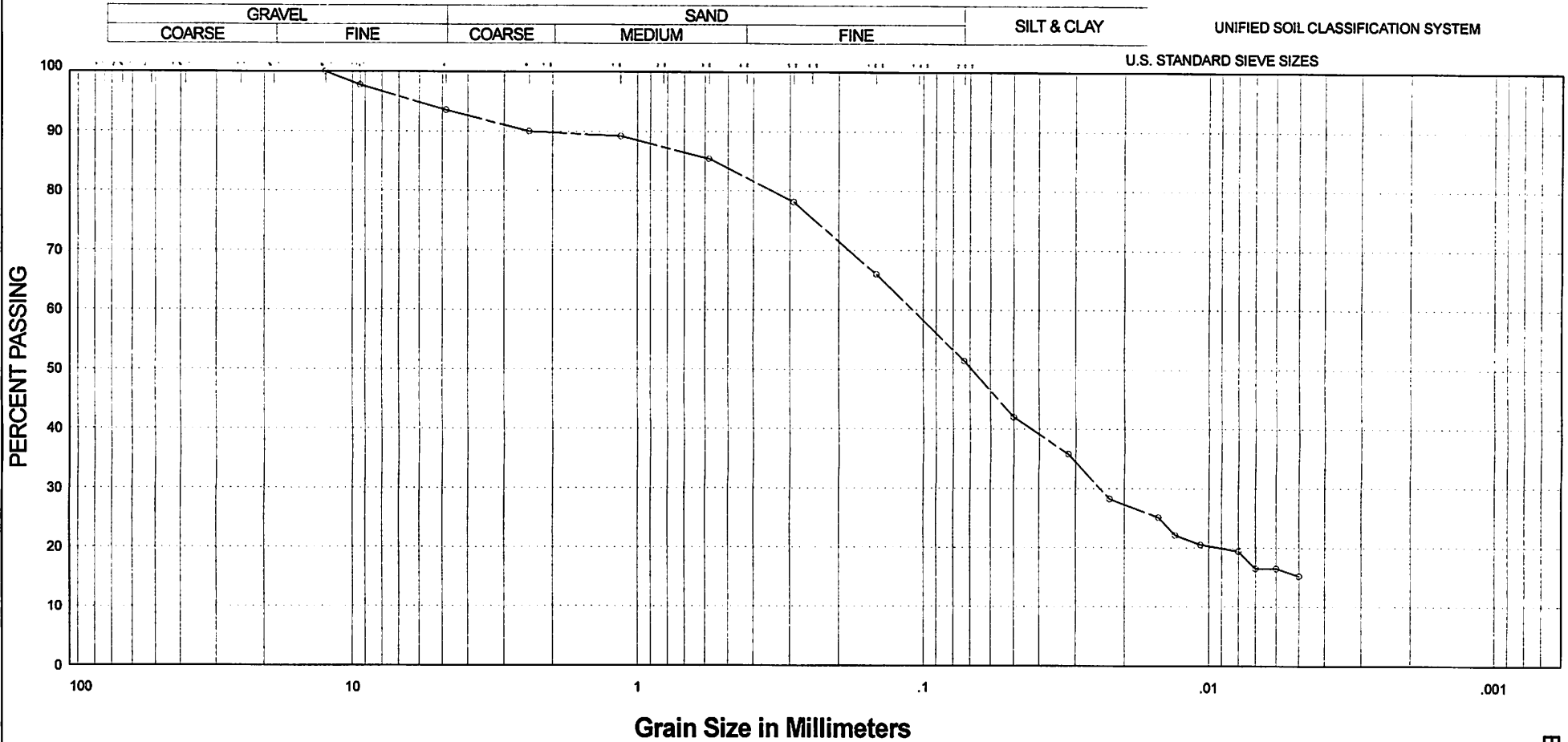
ENCLOSURE N° 9





# GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4091-19-3



PROJECT: Proposed residential Development  
 LOCATION: 1871 & 1879 Gordon St, Guelph, ON  
 MONITORING WELL N°: 1  
 SAMPLE N°: 15  
 DEPTH: 18.3 - 18.7m±  
 ELEVATION: 81.7 - 81.3m±

COEFFICIENT OF UNIFORMITY:  
 COEFFICIENT OF CURVATURE:

**Classification of Sample and Group Symbol:**  
  
 SAND AND SILT TILL. some clay, trace gravel

**PLASTIC PROPERTIES**  
 LIQUID LIMIT           % = 0  
 PLASTIC LIMIT         % = 0  
 PLASTICITY INDEX     % = 0  
 MOISTURE CONTENT    % = 10.5

ENCLOSURE N° 10

