



Environmental

Geotechnical

Building Sciences

Construction  
Monitoring

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**Locations**

Peterborough  
Kingston  
Barrie  
Oshawa

**Laboratory**

Peterborough



August 27, 2018

City of Kawartha Lakes  
26 Francis Street,  
Lindsay, ON K9V 5R8

Via email: [rmonaghan@kawarthalakes.ca](mailto:rmonaghan@kawarthalakes.ca)

Attn: Richard Monaghan, C.E.T.  
Senior Engineering Technician

**Re: Characterization of Street Sweepings**  
**City of Kawartha Lakes, Ontario**  
**Cambium Reference: 7817-001**

---

Dear Mr. Monaghan,

The City of Kawartha Lakes is seeking reuse possibilities for the road sweepings that are collected at the end of the winter from the City roads. Rather than disposing the sweepings as waste, the winter sand sweepings are stockpiled at the Bobcaygeon, Coboconk, and Omemee facilities. Cambium Inc. (Cambium) was retained by the City of Kawartha Lakes (Client) to complete physical and chemical characterization of the sweepings in order to identify potential reuse options for this material.

Samples of the sweepings were provided by the City. The chemical testing was completed by SGS Environmental Laboratories in Lakefield, Ontario. The physical testing was completed at Cambium's CCIL-certified materials testing laboratory in Peterborough, Ontario.

## CHEMICAL TESTING RESULTS

Each sample was tested for the following parameters: petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene, and xylenes (BTEX) and metals and inorganics. Analytical results were compared to the Table 1 and Table 2 Site Condition Standards (SCS) of the O.Reg. 153/04 *Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* (MOE, 2011). Table 1 applies to the *Full Depth Background Site Condition Standards* and Table 2 applies to *Full Depth Generic Site Condition Standards in a Potable Ground Water Condition*. Industrial / Commercial / Community (ICC)



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Property Use and coarse-grained soils were selected to determine concentration exceedances for the analyzed parameters. It is noted that Community Property Use includes municipal road right-of-ways.

Table 1 SCS represent typical background concentrations encountered throughout Ontario, and are the most stringent criteria available for comparison. Soil that meets the Table 1 SCS is generally considered clean fill and can be handled as such. Table 2 SCS are less stringent, such that soil that exceeds the Table 2 SCS is generally considered contaminated and has to be disposed at a facility (e.g., landfill) that accepts such waste. Analytical results were compared to both the Table 1 and Table 2 SCS to determine appropriate reuse of the soil.

Laboratory analytical results reported electrical conductivity (EC) and sodium adsorption ratio (SAR) in the sample collected from the Oakwood Depot at concentrations exceeding the Table 1 standards, but less than the Table 2 standards. It is likely that the observed EC and SAR exceedances are due to the use of de-icing salt. The results also reported PHC F3 and/or F4 in the samples collected from the Coboconk and Oakwood depots at concentrations exceeding the Table 1 standards, but less than the Table 2 standards. It is likely that the observed PHC F3 and F4 concentrations are due to asphalt inclusions in the samples. All other tested parameters were reported at concentrations less than the Table 1 and Table 2 Standards, as shown in the attached analytical summary table and the Laboratory Certificates of Analysis.

Based on the laboratory results, the sampled material is suitable for reuse at sites for which the Table 2 SCS for ICC Property Use and coarse-grained soils apply. Accordingly, the soil should not be placed on agricultural or residential land, nor within 30 m of a water body, but is generally suitable for the reuse options provided below.

## GRADATION AND PHYSICAL TESTING RESULTS

The gradation test results and micro-deval fine aggregate loss results are attached to this letter and summarized in Table 1.



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**Table 1 Gradation and Physical Testing Results**

Sieve (mm)	Oakwood Depot (% passing)	Bobcaygeon Depot (% passing)	Coboconk Depot (% passing)
26.5	100	100	100
13.2	99.6	99.8	99.7
9.5	98.2	98.6	98.9
4.75	90.7	91.7	91.6
1.18	48.9	61.5	52.2
0.300	20.2	28.4	12.3
0.150	11.6	15.4	5.1
0.075	7.5	8.8	2.6
Fine Aggregate % loss	9.7%	10.7%	9.4%

The material from the Oakwood and Coboconk Depots meet the gradation requirements for Granular B Type 1 and SSM material. The material from the Bobcaygeon Depot meets the SSM gradation requirements but does not meet the Granular B Type 1 gradation requirements due to the fines percentage of 8.8%, which is slightly more than the maximum of 8% in the specification.

## REUSE OPTIONS

Based on the results of the gradation and physical testing the stockpiled street sweepings would be suitable for reuse as a Granular B Type 1 material (except for the Bobcaygeon Depot) or a Select Subgrade Material in the following situations.

- As backfill material against exterior building foundations or culverts.
- As upfill material to obtain a higher subgrade on road widenings or grade raises, prior to being covered with Granular B and Granular A. Due to the lack of stone sized particles, the reused screenings should be kept out of high traffic road subbase.



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- As sand backfill around catchbasins and manholes to prevent frost jacking and differential settlement due to it's low frost susceptibility and micro deval loss.

The stockpiled street sweepings did not meet the gradation requirements for reuse as winter sand, which requires 100% passing the 9.5 mm sieve and <5% passing the 75 µm sieve.

We trust that this letter report meets with your immediate requirements. If you have further questions or comments, please contact the undersigned at 705-742-7900 ext. 220 or 336.

Best regards,

**Cambium Inc.**

Bernie Taylor, P.Eng.  
Project Manager - Environmental

Jennifer Wales, P.Eng.  
Project Manager - Geotechnical

BT/JW

*Encl. Table 2 – Summary of Soil Quality – Metals, Inorganics, BTEX and PHCs  
Laboratory Certificates of Analysis  
Gradation and Physical Testing Results*

*P:\7800 to 7899\7817-001 City of Kawartha Lakes - Soil Testing - Various Works Yards\Deliverables\2018-08-27 LTR Soil Characterization for CKL.docx*



August 27, 2018

## QUALIFICATIONS AND LIMITATIONS

### Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

### Reliance on Materials and Information

The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

Facts, conditions, information and circumstances may vary with time and locations and Cambium's work is based on a review of such matters as they existed at the particular time and location indicated in its reports. No assurance is made by Cambium that the facts, conditions, information, circumstances or any underlying assumptions made by Cambium in connection with the work performed will not change after the work is completed and a report is submitted. If any such changes occur or additional information is obtained, Cambium should be advised and requested to consider if the changes or additional information affect its findings or results.

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### Site Assessments

A Site assessment is created using data and information collected during the investigation of a Site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

Only conditions at the Site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the Site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.

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### Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.

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Table 2 - Summary of Soil Quality (Metals, Inorganics, BTEX and PHCs)

Sample Identification		Units	Laboratory Reportable Detection Limit (RDL)	Table 1 Standards <sup>1</sup>	Table 2 Standards <sup>2</sup>	Coboconk Depot 15-Jun-18	Oakwood Depot 15-Jun-18	Bobcaygeon Depot 15-Jun-18
Sample Date								
Barium	µg/g	0.1		220	670	22	16	18
Beryllium	µg/g	0.02		2.5	8	0.09	0.09	0.12
Boron	µg/g	1		36	120	3	4	3
Cadmium	µg/g	0.02		1.2	1.9	0.02	< 0.02	< 0.02
Chromium	µg/g	0.5		70	160	3.6	5.1	3.9
Cobalt	µg/g	0.01		21	80	1.5	1.2	1.6
Copper	µg/g	0.1		92	230	6.4	4.9	6.8
Lead	µg/g	0.1		120	120	2.6	2.1	1.5
Molybdenum	µg/g	0.1		2	40	0.1	0.2	< 0.1
Nickel	µg/g	0.5		82	270	3.7	3.2	3.4
Silver	µg/g	0.05		0.5	40	< 0.05	< 0.05	< 0.05
Thallium	µg/g	0.02		1	3.3	0.03	0.02	0.03
Uranium	µg/g	0.002		2.5	33	0.25	0.3	0.22
Vanadium	µg/g	3		86	86	9	5	8
Zinc	µg/g	0.7		290	340	13	14	9.5
Antimony	µg/g	0.8		1.3	40	< 0.8	< 0.8	< 0.8
Arsenic	µg/g	0.5		18	18	0.8	1	0.6
Selenium	µg/g	0.7		1.5	5.5	< 0.7	< 0.7	< 0.7
Mercury	µg/g	0.05		0.27	3.9	< 0.05	< 0.05	< 0.05
Boron (Hot Water Soluble)	µg/g	0.5		NV	2	< 0.5	< 0.5	< 0.5
Sodium Adsorption Ratio		0.2		2.4	12	0.4	<b>8.7</b>	0.3
Conductivity	mS/cm	0.002		0.57	1.4	0.13	<b>1.3</b>	0.13
pH	N/A	0.05		NV	NV	8.21	8.15	8.21
Chromium VI	µg/g	0.2		0.66	8	< 0.2	< 0.2	< 0.2
Cyanide	µg/g	0.05		0.051	0.051	< 0.05	< 0.05	< 0.05
Benzene	µg/g	0.02		0.02	0.32	< 0.02	< 0.02	< 0.02
Ethylbenzene	µg/g	0.05		0.05	1.1	< 0.05	< 0.05	< 0.05
Toluene	µg/g	0.05		0.2	6.4	< 0.05	< 0.05	< 0.05
Xylene Mixture	µg/g	0.05		0.05	26	< 0.05	< 0.05	< 0.05
F1 (C8 to C10)	µg/g	10		25	55	< 10	< 10	< 10
F2 (C10 to C16)	µg/g	10		10	230	< 10	< 10	< 10
F3 (C16 to C34)	µg/g	50		240	1700	<b>245</b>	225	< 50
F4 (C34 to C50)	µg/g	50		120	3300	<b>485</b>	<b>360</b>	58
Gravimetric Heavy Hydrocarbons	µg/g	200		120	3300	<b>1510</b>	<b>1050</b>	---

Notes:

1. Table 1 (Soil Other Than Sediment, Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use) of the Soil Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

2. Table 2 (Soil Other Than Sediment, Industrial/Commercial/Community Property Uses, Coarse) of the Soil Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

Bold - value exceeds Table 1 standard.

Bold and Shaded - value exceeds Table 2 standard.

Bold and underline - Laboratory RDL exceeds standard.

"NV" indicates no value.

"," indicates value not analyzed.



## FINAL REPORT

CA14576-JUN18 R

7817-001 Bernie Taylor

Prepared for

**Cambium Inc.**

## First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Cambium Inc.	Project Specialist	Brian Graham B.Sc.
Address	52 Hunter Street East Peterborough, ON K9H 1G5, Canada	Laboratory	SGS Canada Inc.
Contact	Bernie Taylor	Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-742-7900	Telephone	705-652-2143
Facsimile	705-742-7907	Facsimile	705-652-6365
Email	bernie.taylor@cambium-inc.com; file@cambium-inc.com	Email	brian.graham@sgs.com
Project	7817-001 Bernie Taylor	SGS Reference	CA14576-JUN18
Order Number		Received	06/18/2018
Samples	Soil (3)	Approved	06/25/2018
		Report Number	CA14576-JUN18 R
		Date Reported	06/25/2018

## COMMENTS

CCME Method Compliance: Analyses were conducted using analytical procedures that comply with the Reference Method for the CWS for Petroleum Hydrocarbons in Soil and have been validated for use at the SGS laboratory, Lakefield, ON site.

Quality Compliance: Instrument performance / calibration quality criteria were met and extraction and analysis limits for holding times were met.

nC6 and nC10 response factors within 30% of response factor for toluene: YES

nC10, nC16 and nC34 response factors within 10% of the average response for the three compounds: YES

C50 response factors within 70% of nC10 + nC16 + nC34 average: YES

Linearity is within 15%: YES

F4G - gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.

The results for F4 and F4G are both reported and the greater of the two values is to be used in application to the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

Temperature of Sample upon Receipt: 3 degrees C

Cooling Agent Present: Yes

Custody Seal Present: No

## SIGNATORIES



Brian Graham B.Sc.



# FINAL REPORT

CA14576-JUN18 R

**Client:** Cambium Inc.  
**Project:** 7817-001 Bernie Taylor  
**Project Manager:** Bernie Taylor  
**Samplers:** Steve Elford

## PACKAGE: REG153 - BTEX (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED  
L2 = REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED

### Parameter BTEx

Parameter	Units	RL	L1	L2	Result	Result
Benzene	µg/g	0.02	0.02	0.32	< 0.02	< 0.02
Ethylbenzene	µg/g	0.05	0.05	1.1	< 0.05	< 0.05
Toluene	µg/g	0.05	0.2	6.4	< 0.05	< 0.05
Xylene (total)	µg/g	0.05	0.05	26	< 0.05	< 0.05
m/p-xylene	µg/g	0.05			< 0.05	< 0.05
o-xylene	µg/g	0.05			< 0.05	< 0.05

## PACKAGE: REG153 - Hydrides (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED  
L2 = REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED

### Parameter Hydrides

Parameter	Units	RL	L1	L2	Result	Result
Antimony	µg/g	0.8	1.3	40	< 0.8	< 0.8
Arsenic	µg/g	0.5	18	18	0.8	1.0
Selenium	µg/g	0.7	1.5	5.5	< 0.7	< 0.7



# FINAL REPORT

CA14576-JUN18 R

**Client:** Cambium Inc.  
**Project:** 7817-001 Bernie Taylor  
**Project Manager:** Bernie Taylor  
**Samplers:** Steve Elford

## PACKAGE: REG153 - Metals and Inorganics (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED  
L2 = REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED

### Parameter Metals and Inorganics

Parameter	Units	RL	L1	L2	Sample Matrix	Sample Date	Sample Name	Sample Number	11	12	13
Moisture Content	%	-									
Barium	µg/g	0.1	220	670	Soil	15/06/2018	Coboconk Depot	Soil	2.6	2.6	2.0
Beryllium	µg/g	0.02	2.5	8	Soil	15/06/2018	Oakwood Depot	Soil	22	16	18
Boron	µg/g	1	36	120	Soil	15/06/2018	Bobcaygeon Depot	Soil	0.09	0.09	0.12
Cadmium	µg/g	0.02	1.2	1.9	Soil	15/06/2018		Soil	3	4	3
Chromium	µg/g	0.5	70	160	Soil	15/06/2018		Soil	0.02	< 0.02	< 0.02
Cobalt	µg/g	0.01	21	80	Soil	15/06/2018		Soil	3.6	5.1	3.9
Copper	µg/g	0.1	92	230	Soil	15/06/2018		Soil	1.5	1.2	1.6
Lead	µg/g	0.1	120	120	Soil	15/06/2018		Soil	6.4	4.9	6.8
Molybdenum	µg/g	0.1	2	40	Soil	15/06/2018		Soil	2.6	2.1	1.5
Nickel	µg/g	0.5	82	270	Soil	15/06/2018		Soil	0.1	0.2	< 0.1
Silver	µg/g	0.05	0.5	40	Soil	15/06/2018		Soil	3.7	3.2	3.4
Thallium	µg/g	0.02	1	3.3	Soil	15/06/2018		Soil	< 0.05	< 0.05	< 0.05
Uranium	µg/g	0.002	2.5	33	Soil	15/06/2018		Soil	0.03	0.02	0.03
Vanadium	µg/g	3	86	86	Soil	15/06/2018		Soil	0.25	0.30	0.22
Zinc	µg/g	0.7	290	340	Soil	15/06/2018		Soil	9	5	8
Water Soluble Boron	µg/g	0.5		2	Soil	15/06/2018		Soil	13	14	9.5
									< 0.5	< 0.5	< 0.5



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CA14576-JUN18 R

**Client:** Cambium Inc.  
**Project:** 7817-001 Bernie Taylor  
**Project Manager:** Bernie Taylor  
**Samplers:** Steve Elford

## PACKAGE: REG153 - Other (ORP) (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED  
L2 = REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED

### Parameter

#### Other (ORP)

Parameter	Units	RL	L1	L2	Result	Result	Result
Mercury	µg/g	0.05	0.27	3.9	< 0.05	< 0.05	< 0.05
Sodium Adsorption Ratio	---	0.2	2.4	12	0.4	8.7	0.3
Conductivity	mS/cm	0.002	0.57	1.4	0.13	1.3	0.13
pH	no unit	0.05			8.21	8.15	8.21
Chromium VI	µg/g	0.2	0.66	8	< 0.2	< 0.2	< 0.2
Free Cyanide	µg/g	0.05	0.051	0.051	< 0.05	< 0.05	< 0.05

## PACKAGE: REG153 - PHCs (SOIL)

L1 = REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED  
L2 = REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED

### Parameter

#### PHCs

Parameter	Units	RL	L1	L2	Result	Result	Result
F1 (C6-C10)	µg/g	10	25	55	< 10	< 10	< 10
F1-BTEX (C6-C10)	µg/g	10			< 10	< 10	< 10
F2 (C10-C16)	µg/g	10	10	230	< 10	< 10	< 10
F3 (C16-C34)	µg/g	50	240	1700	245	225	< 50
F4 (C34-C50)	µg/g	50	120	3300	485	360	58
F4G-sg (GHH)	µg/g	200	120	3300	1510	1050	
Chromatogram returned to baseline at nC50	Yes / No	-			NO	NO	YES

## EXCEEDANCE SUMMARY

				REG153 / SOIL / COARSE - TABLE 1 - Residential/Parkland/Industrial - UNDEFINED	REG153 / SOIL / COARSE - TABLE 2 - Industrial/Commercial - UNDEFINED
Parameter	Method	Units	Result	L1	L2

### Coboconk Depot

F3 (C16 to C34)	CCME Tier 1	µg/g	245	240	
F4 (C34 to C50)	CCME Tier 1	µg/g	485	120	
Gravimetric Heavy Hydrocarbons	CCME Tier 1	µg/g	1510	120	

### Oakwood Depot

F4 (C34 to C50)	CCME Tier 1	µg/g	360	120	
Gravimetric Heavy Hydrocarbons	CCME Tier 1	µg/g	1050	120	
Conductivity	EPA 6010/SM 2510	mS/cm	1.3	0.57	
Sodium Adsorption Ratio	MOE 4696e01/EPA 6010	--	8.7	2.4	



# FINAL REPORT

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## QC SUMMARY

### Conductivity

Method: EPA 6010/SM 2510 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)	High	Spike Recovery (%)	Low	High
Conductivity	EWL0321-JUN18	mS/cm	0.002	<0.002	0	10	99	90	110	NA		

### Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)	High	Spike Recovery (%)	Low	High
Free Cyanide	SKA5046-JUN18	µg/g	0.05	<0.05	ND	20	96	80	120	100	75	125

### Hexavalent Chromium by IC

Method: EPA218.6/EPA3060A | Internal ref.: ME-CA-IENVIC-LAK-AN-008

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)	High	Spike Recovery (%)	Low	High
Chromium VI	DIO0386-JUN18	µg/g	0.2	<0.2	0	20	104	80	120	100	75	125



FINAL REPORT

CA14576-JUN18 R

QC SUMMARY

Mercury by CVAAS  
Method: EPA 7471A/EPA 245 | Internal ref.: ME-CA-IENVISPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Low	High
Mercury	EMS0099-JUN18	µg/g	0.05	<0.05	2	20	110	80	120	103	70	130

Metals in aqueous samples - ICP-OES  
Method: MOE 4696e01/EPA 6010 | Internal ref.: ME-CA-IENVISPE-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Low	High
SAR Calcium	ESG0056-JUN18	mg/L	0.09	0.1173	4	20	96	80	120	NV	70	130
SAR Magnesium	ESG0056-JUN18	mg/L	0.02	<0.02	10	20	94	80	120	NV	70	130
SAR Sodium	ESG0056-JUN18	mg/L	0.15	<0.15	2	20	91	80	120	NV	70	130



# FINAL REPORT

CA14576-JUN18 R

## QC SUMMARY

Metals in Soil - Aqua-regia/ICP-MS

Method: EPA 3050/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver	EMS0099-JUN18	ug/g	0.05	<0.05	12	20	92	70	130	98	70	130
Arsenic	EMS0099-JUN18	µg/g	0.5	<0.5	2	20	97	70	130	101	70	130
Barium	EMS0099-JUN18	ug/g	0.1	<0.1	0	20	102	70	130	92	70	130
Beryllium	EMS0099-JUN18	µg/g	0.02	<0.02	1	20	100	70	130	100	70	130
Boron	EMS0099-JUN18	µg/g	1	<1	12	20	100	70	130	103	70	130
Cadmium	EMS0099-JUN18	µg/g	0.02	<0.02	2	20	97	70	130	107	70	130
Cobalt	EMS0099-JUN18	µg/g	0.01	<0.01	1	20	101	70	130	112	70	130
Chromium	EMS0099-JUN18	µg/g	0.5	<0.5	0	20	103	70	130	109	70	130
Copper	EMS0099-JUN18	µg/g	0.1	<0.1	1	20	103	70	130	108	70	130
Molybdenum	EMS0099-JUN18	µg/g	0.1	<0.1	10	20	100	70	130	116	70	130
Nickel	EMS0099-JUN18	ug/g	0.5	<0.5	1	20	103	70	130	110	70	130
Lead	EMS0099-JUN18	ug/g	0.1	<0.1	ND	20	100	70	130	102	70	130
Antimony	EMS0099-JUN18	µg/g	0.8	<0.8	20	20	107	70	130	108	70	130
Selenium	EMS0099-JUN18	µg/g	0.7	<0.7	4	20	99	70	130	104	70	130
Thallium	EMS0099-JUN18	µg/g	0.02	<0.02	10	20	99	70	130	109	70	130
Uranium	EMS0099-JUN18	µg/g	0.002	<0.002	3	20	97	70	130	94	70	130
Vanadium	EMS0099-JUN18	µg/g	3	<3	1	20	100	70	130	108	70	130
Zinc	EMS0099-JUN18	µg/g	0.7	<0.7	1	20	101	70	130	103	70	130



FINAL REPORT

CA14576-JUN18 R

QC SUMMARY

Metals Prep

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
Prep-Hotblock	EMS0099-JUN18	Prep	no		Error!		Error!			Error!		

Petroleum Hydrocarbons (F1)

Method: CCME Tier 1 | Internal ref.: ME-CA-IENVIGC-LAK-AN-010

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
F1 (C6-C10)	GCM0311-JUN18	µg/g	10	<10	ND	30	92	80	120	94	60	140



FINAL REPORT

CA14576-JUN18 R

QC SUMMARY

Petroleum Hydrocarbons (F2-F4)  
Method: CCME Tier 1 | Internal ref.: ME-CA-TENVIGC-LAK-AN-010

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	High
F2 (C10-C16)	GCM0312-JUN18	µg/g	10	<10	ND	30	116	80	120	111	60	140
F3 (C16-C34)	GCM0312-JUN18	µg/g	50	<50	ND	30	116	80	120	111	60	140
F4 (C34-C50)	GCM0312-JUN18	µg/g	50	<50	ND	30	116	80	120	111	60	140

Petroleum Hydrocarbons (F4G)  
Method: CCME Tier 1 | Internal ref.: ME-CA-TENVIGC-LAK-AN-010

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	High
F4G-sg (GHH)	GCM0367-JUN18	µg/g	200	<200	NA	30	93	80	120	NA	60	140



# FINAL REPORT

CA14576-JUN18 R

## QC SUMMARY

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Low	High
pH	ARD0081-JUN18	no unit	0.05		0	20	100	80	120			

Volatile Organics

Method: EPA 5035A/5030B/8260C | Internal ref.: ME-CA-IENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Low	High
Benzene	GCM0310-JUN18	µg/g	0.02	< 0.02	ND	50	87	60	130	88	50	140
Ethylbenzene	GCM0310-JUN18	µg/g	0.05	< 0.05	ND	50	88	60	130	91	50	140
m/p-xylene	GCM0310-JUN18	µg/g	0.05	< 0.05	ND	50	85	60	130	89	50	140
o-xylene	GCM0310-JUN18	µg/g	0.05	< 0.05	ND	50	87	60	130	90	50	140
Toluene	GCM0310-JUN18	µg/g	0.05	< 0.05	ND	50	87	60	130	89	50	140



FINAL REPORT

CA14576-JUN18 R

QC SUMMARY

Water Soluble Boron  
Method: O.Reg. 153/04 | Internal ref.: ME-CA-IENV1 SPE-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Low	High
Water Soluble Boron	ESG0050-JUN18	µg/g	0.5	<0.5	ND	20	97	80	120	102	70	130

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

**Multielement Scan Qualifier:** as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

**Duplicate Qualifier:** for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

**Matrix Spike Qualifier:** for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

## LEGEND

### FOOTNOTES

**NSS** Insufficient sample for analysis.

**RL** Reporting Limit.

↑ Reporting limit raised.

↓ Reporting limit lowered.

**NA** The sample was not analysed for this analyte

**ND** Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at [http://www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm). The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full. This report supersedes all previous versions.

-- End of Analytical Report --



# Request for Laboratory Services and CHAIN OF CUSTODY

No:

Page 1 of 1

SGS Environment,  
Health and Safety

- Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365  
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com

Laboratory Information Section - Lab use only

Received By: Karen Hetherton

Received Date: 06/18/18 (mm/dd/yy)

Received Time: 14:10 am / pm (circle)

Received By (signature): [Signature]

Custody Seal Present: Y ☒ N ☐ (circle)

Custody Seal Intact: Y ☒ N ☐ (circle)

Cooling Agent Present: Y N Type: Ice

Temperature Upon Receipt (°C) 3x3

CA 14576-JAN18

LAB LIMS #:

## REPORT INFORMATION

Company: Cambium

Contact: Bernie Taylor

Address: 52 Hunter Street East

Peterborough

705-742-7600

Phone:

Fax:

Email: bernie.taylor@cambiuminc.com

## INVOICE INFORMATION

☒ (same as Report Information)

Company:

Contact:

Address:

Phone:

## PROJECT INFORMATION

Quotation #:

Project #:

P.O. #:

Site Location/ID:

## TURNAROUND TIME (TAT) REQUIRED

TAT's are quoted in business days (exclude statutory holidays & weekends).

Samples received after 3pm or on weekends : TAT begins the next business day

☒ Regular TAT (5-7days) ☐ 1 Day ☐ 2 Days ☐ 3-4 Days

**RUSH TAT (Additional Charges May Apply)**

**PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION**

Specify Due Date: Rush Confirmation ID:

## REGULATIONS

### Regulation 153 (2011):

☒ Table 1 ☐ Res/Park ☐ Soil Texture:

☒ Table 2 ☒ Ind/Com ☒ Coarse

☐ Table 3 ☐ Agri/Other ☐ Medium

☐ Table ☐ Fine

### Other Regulations:

☐ Reg 347/558 (3 Day min TAT)

☐ PW/QO ☐ MMER

☐ CCME ☐ Other:

☐ MISA

### Sewer By-Law:

☐ Sanitary

☐ Storm

Municipality:

## RECORD OF SITE CONDITION (RSC) ☐ YES ☒ NO

### SAMPLE IDENTIFICATION

1 Cobocank Depot

2 Oakwood Depot

3 Bobcaygeon Depot

4

5

6

7

8

9

10

DATE SAMPLED

2018/06/15

↓

↓

TIME SAMPLED

1530

1535

1540

MATRIX

Soil

↓

↓

# OF BOTTLES

4

4

6

## ANALYSIS REQUESTED

Metals + Inorganics

FA-F4

BTEX/FI

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

COMMENTS:  
Field Filtered (F)  
Preserved (P)

DRINKING WATER SAMPLES (POTABLE WATER FOR HUMAN CONSUMPTION) MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

Observations/Comments/Special Instructions

Sampled By (NAME): Steve Elford

Relinquished by (NAME): Steve Elford

Signature: [Signature]

Signature: [Signature]

Date: 18/06/18

Date: 18/06/18

Pink Copy - Client

Yellow & White Copy - SGS



## SAMPLE INTEGRITY REPORT

Project Number: 7817-001

ONTARIO REGULATION 153/04

SGS Sample ID CA14576-JUN18

Date / Time Sampled JUN15/18

Client Sample ID See CoC

ALL

### Sample Submission General Sample Integrity Violations

- |  |                          |
|--|--------------------------|
| Temperature >10 C upon receipt if not sampled same day     | <input type="checkbox"/> |
| No evidence of cooling trend initiated if sampled same day | <input type="checkbox"/> |
| Chain of Custody not submitted                             | <input type="checkbox"/> |
| Chain of Custody incomplete                                | <input type="checkbox"/> |
| Chain of Custody not signed / dated                        | <input type="checkbox"/> |
| Chain of Custody not a current version                     | <input type="checkbox"/> |
| Bottles / Samples listed on CoC but not received           | <input type="checkbox"/> |
| Bottles / Samples received but not listed on the CoC       | <input type="checkbox"/> |
| Sample container received empty                            | <input type="checkbox"/> |

### Sample Specific Sample Integrity Violations

- |   |                          |                          |                          |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Sample received past hold time                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Incorrect preservation (including no preservation where required) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Headspace present in VOC vial (aqueous)                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sample(s) received frozen   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Bottle(s) broken or damaged in transport                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Discrepancy between sample label and chain of custody             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Analysis requirements absent / unclear                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Missing or incorrect sample label(s)                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Inappropriate sample container used                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Insufficient number of bottles received                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Limited sample volume   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Insufficient sample volume  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sample contains multiple phases                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### Sediment Log

- |  |                          |                          |                          |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Groundwater samples contain visible sediment / particulate                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Groundwater contains greater than 1cm of sediment / particulate matter in bottle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### Additional Comments/Remarks:

No issues upon receipt



Initials:

K14



# AGGREGATES GRADATION REQUIREMENTS OPSS 1010 - GRANULARS, LS-602

**Project Number:** 7817-001      **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client      **Date Sampled:** June 26, 2018  
**Location:** Coboconk Depot  
**Material Type:** No Specs      **Lab Sample No.:** AG-18-0236  
**MTO Contract No.:** N/A

Sieve Size	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
150 mm	--	100	--	100	--	--	--	100	100	
106 mm	--	--	100	--	--	--	--	--	100	
37.5 mm	--	--	--	--	--	100	--	--	100	
26.5 mm	100	50-100	50-100	50-100	--	95-100	100	50-100	100	
19.0 mm	85-100 *87-100	--	--	--	100	80-95	90-100	--	100	
13.2 mm	65-90 *75-95	--	--	--	75-95	60-80	75-100	--	99.7	
9.5 mm	50-73 *60-73	--	--	32-100	55-80	50-70	60-85	--	98.9	
4.75 mm	35-55 *40-60	20-100	20-55	20-90	35-55	20-45	40-60	20-100	91.6	
1.18 mm	15-40	10-100	10-40	10-60	15-40	0-15	20-40	10-100	52.2	
300 µm	2-55	2-65	5-22	2-35	5-22	--	11-25	5-95	12.3	
150 µm	--	--	--	--	--	--	--	2-65	5.1	
75 µm	2.0-8.0 **2.0-10.0	0-8.0 **0-10.0	0-10.0	0-8.0 **0-10.0	2.0-8.0 **2.0-10.0	0-5.0	9.0-15.0 **9.0-17.0	0-25.0	2.6	

**Notes:**

\* When the aggregate is obtained from an iron blast furnace slag source.

\*\* When the aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

Issued by:   
 Stuart Baird, Senior Project Manager

August 7, 2018  
 Date



## AGGREGATES PHYSICAL PROPERTIES REQUIREMENTS OPSS 1010 - GRANULARS, LS-VARIOUS PROCUDURES

**Project Number:** 7817-001      **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client      **Date Sampled:** June 26, 2018  
**Location:** Coboconk Depot  
**Material Type:** No Specs      **Lab Sample No.:** AG-18-0236  
**MTO Contract No.:** N/A

LS Test Procedure Name and Number	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
Crushed Particles % minimum, LS-607	60	-	100	-	60	100	50	-	N/A	N/A
Unconfined Freeze-Thaw, % maximum loss, LS-614	-	-	-	-	-	15	-	-	N/A	N/A
2 or more Crushed Faces % minimum, LS-617	-	-	-	-	-	85 (Note 1)	-	-	N/A	N/A
Micro-Deval Abrasion, Coarse Aggregate % maximum loss LS-618	25	30 (Note 2)	30	30 (Note 2)	25	21	25	30 (Note 2)	N/A	N/A
Micro-Deval Abrasion, Fine Aggregate % maximum loss LS-619	30	35	35	35	30	25	30	-	9.4	Y
Asphalt Coated Particles, % maximum, LS-621	30	30	0	30	30	0	30	0	N/A	N/A
Amount of Contamination, LS-630	(Note 3)									N/A
Plasticity Index, maximum, LS-703/704	0									N/A
Determination of Permeability, k, LS-709	(Note 4)									N/A

**Notes:**

- When Granular O is produced from boulders, cobbles, or gravel retained on the 50 mm sieve.
- The coarse aggregate Micro-Deval abrasion loss test requirement shall be waived if the material has more than 80% passing the 4.75 mm sieve.
- Granular A, B Type I, B Type III, or M may contain up to 15 percent by mass crushed glass or ceramic materials. Granular A, B Type III, M, O, and S shall not contain more than 1.0 percent by mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster. Granular B Type II and SSM shall not contain more than 0.1 percent by mass of wood.
- For materials north of the French/Mattawa Rivers only, the coefficient of permeability, k, shall be greater than  $1.0 \times 10^{-4}$  cm/s or field experience has demonstrated satisfactory performance. Prior data demonstrating compliance with this requirement for k, shall be acceptable provided that such testing has been done within 5 years of the material being used and field performance has continually been shown to be satisfactory.

Issued by:   
 \_\_\_\_\_  
 Stuart Baird, Senior Project Manager

August 7, 2018  
 \_\_\_\_\_  
 Date



## AGGREGATES GRADATION REQUIREMENTS OPSS 1010 - GRANULARS, LS-602

**Project Number:** 7817-001 **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client **Date Sampled:** June 26, 2018  
**Location:** Oakwood Depot  
**Material Type:** No Specs **Lab Sample No.:** AG-18-0237  
**MTO Contract No.:** N/A

Sieve Size	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
150 mm	--	100	--	100	--	--	--	100	100	
106 mm	--	--	100	--	--	--	--	--	100	
37.5 mm	--	--	--	--	--	100	--	--	100	
26.5 mm	100	50-100	50-100	50-100	--	95-100	100	50-100	100	
19.0 mm	85-100 *87-100	--	--	--	100	80-95	90-100	--	100	
13.2 mm	65-90 *75-95	--	--	--	75-95	60-80	75-100	--	99.6	
9.5 mm	50-73 *60-73	--	--	32-100	55-80	50-70	60-85	--	98.2	
4.75 mm	35-55 *40-60	20-100	20-55	20-90	35-55	20-45	40-60	20-100	90.7	
1.18 mm	15-40	10-100	10-40	10-60	15-40	0-15	20-40	10-100	48.9	
300 µm	2-55	2-65	5-22	2-35	5-22	--	11-25	5-95	20.2	Y
150 µm	--	--	--	--	--	--	--	2-65	11.6	
75 µm	2.0-8.0 **2.0-10.0	0-8.0 **0-10.0	0-10.0	0-8.0 **0-10.0	2.0-8.0 **2.0-10.0	0-5.0	9.0-15.0 **9.0-17.0	0-25.0	7.5	Y

**Notes:**

\* When the aggregate is obtained from an iron blast furnace slag source.

\*\* When the aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

Issued by:

Stuart Baird, Senior Project Manager

August 7, 2018

Date



## AGGREGATES PHYSICAL PROPERTIES REQUIREMENTS OPSS 1010 - GRANULARS, LS-VARIOUS PROCUDURES

**Project Number:** 7817-001 **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client **Date Sampled:** June 26, 2018  
**Location:** Oakwood Depot  
**Material Type:** No Specs **Lab Sample No.:** AG-18-0237  
**MTO Contract No.:** N/A

LS Test Procedure Name and Number	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
Crushed Particles % minimum, LS-607	60	-	100	-	60	100	50	-	N/A	N/A
Unconfined Freeze-Thaw, % maximum loss, LS-614	-	-	-	-	-	15	-	-	N/A	N/A
2 or more Crushed Faces % minimum, LS-617	-	-	-	-	-	85 (Note 1)	-	-	N/A	N/A
Micro-Deval Abrasion, Coarse Aggregate % maximum loss LS-618	25	30 (Note 2)	30	30 (Note 2)	25	21	25	30 (Note 2)	N/A	N/A
Micro-Deval Abrasion, Fine Aggregate % maximum loss LS-619	30	35	35	35	30	25	30	-	9.7	Y
Asphalt Coated Particles, % maximum, LS-621	30	30	0	30	30	0	30	0	N/A	N/A
Amount of Contamination, LS-630	(Note 3)									N/A
Plasticity Index, maximum, LS-703/704	0									N/A
Determination of Permeability, k, LS-709	(Note 4)									N/A

### Notes:

1. When Granular O is produced from boulders, cobbles, or gravel retained on the 50 mm sieve.
2. The coarse aggregate Micro-Deval abrasion loss test requirement shall be waived if the material has more than 80% passing the 4.75 mm sieve.
3. Granular A, B Type I, B Type III, or M may contain up to 15 percent by mass crushed glass or ceramic materials. Granular A, B Type III, M, O, and S shall not contain more than 1.0 percent by mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster. Granular B Type II and SSM shall not contain more than 0.1 percent by mass of wood.
4. For materials north of the French/Mattawa Rivers only, the coefficient of permeability, k, shall be greater than  $1.0 \times 10^{-4}$  cm/s or field experience has demonstrated satisfactory performance. Prior data demonstrating compliance with this requirement for k, shall be acceptable provided that such testing has been done within 5 years of the material being used and field performance has continually been shown to be satisfactory.

Issued by:

Stuart Baird, Senior Project Manager

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Date



# AGGREGATES GRADATION REQUIREMENTS

## OPSS 1010 - GRANULARS, LS-602

**Project Number:** 7817-001      **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client      **Date Sampled:** June 26, 2018  
**Location:** Bobcaygeon Depot  
**Material Type:** No Specs      **Lab Sample No.:** AG-18-0238  
**MTO Contract No.:** N/A

Sieve Size	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
150 mm	--	100	--	100	--	--	--	100	100	
106 mm	--	--	100	--	--	--	--	--	100	
37.5 mm	--	--	--	--	--	100	--	--	100	
26.5 mm	100	50-100	50-100	50-100	--	95-100	100	50-100	100	
19.0 mm	85-100 *87-100	--	--	--	100	80-95	90-100	--	100	
13.2 mm	65-90 *75-95	--	--	--	75-95	60-80	75-100	--	99.8	
9.5 mm	50-73 *60-73	--	--	32-100	55-80	50-70	60-85	--	98.6	
4.75 mm	35-55 *40-60	20-100	20-55	20-90	35-55	20-45	40-60	20-100	91.7	
1.18 mm	15-40	10-100	10-40	10-60	15-40	0-15	20-40	10-100	61.5	
300 µm	2-55	2-65	5-22	2-35	5-22	--	11-25	5-95	28.4	
150 µm	--	--	--	--	--	--	--	2-65	15.4	
75 µm	2.0-8.0 **2.0-10.0	0-8.0 **0-10.0	0-10.0	0-8.0 **0-10.0	2.0-8.0 **2.0-10.0	0-5.0	9.0-15.0 **9.0-17.0	0-25.0	8.8	

**Notes:**

\* When the aggregate is obtained from an iron blast furnace slag source.

\*\* When the aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

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## AGGREGATES PHYSICAL PROPERTIES REQUIREMENTS OPSS 1010 - GRANULARS, LS-VARIOUS PROCUDRES

**Project Number:** 7817-001 **Client:** City of Kawartha Lakes  
**Project Name:** Soil Testing - Various Works Yards  
**Sampled By:** Client **Date Sampled:** June 26, 2018  
**Location:** Bobcaygeon Depot  
**Material Type:** No Specs **Lab Sample No.:** AG-18-0238  
**MTO Contract No.:** N/A

LS Test Procedure Name and Number	Gradation Requirement, % Passing								Test Result	
	A	B			M	O	S	SSM	Sample	Meets Requirements (Y/N)
		Type I	Type II	Type III						
Crushed Particles % minimum, LS-607	60	-	100	-	60	100	50	-	N/A	N/A
Unconfined Freeze-Thaw, % maximum loss, LS-614	-	-	-	-	-	15	-	-	N/A	N/A
2 or more Crushed Faces % minimum, LS-617	-	-	-	-	-	85 (Note 1)	-	-	N/A	N/A
Micro-Deval Abrasion, Coarse Aggregate % maximum loss LS-618	25	30 (Note 2)	30	30 (Note 2)	25	21	25	30 (Note 2)	N/A	N/A
Micro-Deval Abrasion, Fine Aggregate % maximum loss LS-619	30	35	35	35	30	25	30	-	10.7	Y
Asphalt Coated Particles, % maximum, LS-621	30	30	0	30	30	0	30	0	N/A	N/A
Amount of Contamination, LS-630	(Note 3)									N/A
Plasticity Index, maximum, LS-703/704	0									N/A
Determination of Permeability, k, LS-709	(Note 4)									N/A

**Notes:**

- When Granular O is produced from boulders, cobbles, or gravel retained on the 50 mm sieve.
- The coarse aggregate Micro-Deval abrasion loss test requirement shall be waived if the material has more than 80% passing the 4.75 mm sieve.
- Granular A, B Type I, B Type III, or M may contain up to 15 percent by mass crushed glass or ceramic materials. Granular A, B Type III, M, O, and S shall not contain more than 1.0 percent by mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster. Granular B Type II and SSM shall not contain more than 0.1 percent by mass of wood.
- For materials north of the French/Mattawa Rivers only, the coefficient of permeability, k, shall be greater than  $1.0 \times 10^{-4}$  cm/s or field experience has demonstrated satisfactory performance. Prior data demonstrating compliance with this requirement for k, shall be acceptable provided that such testing has been done within 5 years of the material being used and field performance has continually been shown to be satisfactory.

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