metrovancouver

Bottom Ash Data

2023 Week 51

The following analytical report represents bottom ash composite results for week 51 of 2023 (December 17, 2023 to December 23 2023).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23D0839**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Dec-2023 12:45
PO	: VANCO0000051998	Date Analysis Commenced	: 28-Dec-2023
C-O-C number	: ----	Issue Date	: 03-Jan-2024 15:28
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2351-A-1	BA2351-A-2	BA2351-A-3	BA2351-A-4	BA2351-A-5
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
						VA23D0839-001	VA23D0839-002	VA23D0839-003	VA23D0839-004	VA23D0839-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		23.3	22.5	21.5	23.3	22.9
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.3	12.3	12.3	12.2
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		37700	32900	31700	32700	31400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		167	193	186	168	170
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.2	23.3	28.3	24.2	26.6
Barium	7440-39-3	E440/VA	0.50	mg/kg		594	605	529	514	461
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.40	0.37	1.85	0.37	0.37
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		11.2	9.66	12.7	9.74	9.98
Boron	7440-42-8	E440/VA	5.0	mg/kg		180	154	203	279	169
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		12.2	12.4	82.0	13.0	10.6
Calcium	7440-70-2	E440/VA	50	mg/kg		165000	168000	169000	163000	159000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		141	162	149	139	168
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		18.6	99.2	120	41.6	45.1
Copper	7440-50-8	E440/VA	0.50	mg/kg		1810	1830	3160	2930	5530
Iron	7439-89-6	E440/VA	50	mg/kg		35600	47100	37800	42600	42300
Lead	7439-92-1	E440/VA	0.50	mg/kg		412	330	308	292	263
Lithium	7439-93-2	E440/VA	2.0	mg/kg		19.2	20.5	36.2	21.2	25.9
Magnesium	7439-95-4	E440/VA	20	mg/kg		10900	11800	11500	10700	10000
Manganese	7439-96-5	E440/VA	1.0	mg/kg		569	691	917	762	636
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.130	0.0653	0.0700	0.0759	0.0597
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		16.9	16.6	20.7	16.3	18.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg		139	96.0	116	106	130
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7040	9020	8160	8090	7830
Potassium	7440-09-7	E440/VA	100	mg/kg		5790	5820	5180	5300	5180
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.58	0.56	0.59	0.48	0.61
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.27	5.30	15.3	10.9	4.88
Sodium	7440-23-5	E440/VA	50	mg/kg		14200	14900	13100	14000	13500
Strontium	7440-24-6	E440/VA	0.50	mg/kg		325	285	340	333	292

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2351-A-1	BA2351-A-2	BA2351-A-3	BA2351-A-4	BA2351-A-5
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
						VA23D0839-001	VA23D0839-002	VA23D0839-003	VA23D0839-004	VA23D0839-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11400	11700	12200	11200	10700
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		146	139	328	173	124
Titanium	7440-32-6	E440/VA	1.0	mg/kg		247	281	203	218	279
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		8.51	9.14	9.93	11.2	10.3
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.45	3.36	3.51	3.39	3.14
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		50.7	51.7	49.7	58.4	46.5
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4240	3580	4780	3760	4410
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.2	1.5	1.8	2.8	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.2	12.2	12.2	12.2	12.2
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		10.9	10.9	10.9	11.0	11.0
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.52	9.70	9.22	9.17	9.46
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		1.29	1.20	1.32	1.34	1.33
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1830	1850	1810	1820	1870
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.514	0.551	0.504	0.586	0.506
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		69.6	65.1	76.8	77.6	74.8
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2351-A-1	BA2351-A-2	BA2351-A-3	BA2351-A-4	BA2351-A-5
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23D0839-001	VA23D0839-002	VA23D0839-003	VA23D0839-004	VA23D0839-005
						Result	Result	Result	Result	Result
TCLP Metals										
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		0.15	<0.15	0.17	<0.15	0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2351-A-6	BA2351-A-7	BA2351-A-8	BA2351-A-9	BA2351-A-10
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
						VA23D0839-006	VA23D0839-007	VA23D0839-008	VA23D0839-009	VA23D0839-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		23.4	23.2	21.2	23.2	22.7
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.3	12.3	12.3	12.3
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		38200	33900	36100	37100	35000
Antimony	7440-36-0	E440/VA	0.10	mg/kg		168	170	184	146	174
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		23.3	23.1	25.1	25.0	20.9
Barium	7440-39-3	E440/VA	0.50	mg/kg		530	515	576	529	558
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.41	0.43	0.35	0.37
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		16.1	10.3	10.1	11.6	10.5
Boron	7440-42-8	E440/VA	5.0	mg/kg		181	182	166	287	196
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.2	11.4	11.5	13.1	15.3
Calcium	7440-70-2	E440/VA	50	mg/kg		160000	165000	162000	179000	163000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		120	139	124	147	152
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		34.5	36.2	31.5	32.8	106
Copper	7440-50-8	E440/VA	0.50	mg/kg		2140	2630	7650	2250	1030
Iron	7439-89-6	E440/VA	50	mg/kg		39200	34400	47800	35500	43900
Lead	7439-92-1	E440/VA	0.50	mg/kg		380	288	885	483	286
Lithium	7439-93-2	E440/VA	2.0	mg/kg		23.4	20.4	44.6	20.1	22.2
Magnesium	7439-95-4	E440/VA	20	mg/kg		10800	10400	10800	11500	10800
Manganese	7439-96-5	E440/VA	1.0	mg/kg		830	573	3530	604	584
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0657	0.0659	0.0834	0.0778	0.0911
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		14.2	18.8	17.0	17.2	18.1
Nickel	7440-02-0	E440/VA	0.50	mg/kg		106	90.7	113	78.8	108
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7150	7870	8010	10900	7180
Potassium	7440-09-7	E440/VA	100	mg/kg		6020	5720	6120	5680	5880
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.47	0.53	0.58	0.46	0.57
Silver	7440-22-4	E440/VA	0.10	mg/kg		6.93	5.66	>67.5	6.56	>32.5
Sodium	7440-23-5	E440/VA	50	mg/kg		14400	14400	14300	15500	14500
Strontium	7440-24-6	E440/VA	0.50	mg/kg		297	313	314	310	299
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11500	12600	11900	12100	11500

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2351-A-6	BA2351-A-7	BA2351-A-8	BA2351-A-9	BA2351-A-10
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
						VA23D0839-006	VA23D0839-007	VA23D0839-008	VA23D0839-009	VA23D0839-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		138	171	1190	139	130
Titanium	7440-32-6	E440/VA	1.0	mg/kg		288	240	334	205	256
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		12.3	7.86	11.9	7.00	10.4
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.35	3.50	3.27	3.44	3.51
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		48.9	51.3	49.8	50.2	49.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3510	3520	3550	5570	3710
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.7	2.0	2.0	3.6	2.1
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.2	12.2	12.2	12.1	12.2
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		10.8	11.0	11.0	11.0	11.0
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.59	9.78	9.43	9.57	9.21
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		1.31	1.30	1.29	1.27	1.39
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1920	1900	1850	1850	1900
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.488	0.540	0.556	0.541	0.550
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		68.3	63.9	73.2	76.8	82.7
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2351-A-6	BA2351-A-7	BA2351-A-8	BA2351-A-9	BA2351-A-10
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00	20-Dec-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23D0839-006	VA23D0839-007	VA23D0839-008	VA23D0839-009	VA23D0839-010
						Result	Result	Result	Result	Result
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		0.15	0.15	0.16	0.16	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: BA2351-A-11	BA2351-A-12	----	----	----
					Client sampling date / time: 20-Dec-2023 09:00	20-Dec-2023 09:00	----	----	----
					VA23D0839-011	VA23D0839-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144/VA	0.25	%	23.4	24.1	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	12.2	12.3	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	37500	26600	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	209	187	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.7	69.0	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	516	454	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.38	0.43	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	36.7	9.70	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	216	163	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	11.7	11.9	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	173000	166000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	168	131	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	30.1	48.9	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	9650	5610	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	43600	52600	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	1620	425	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	24.4	19.3	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10600	11500	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	619	655	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0695	0.140	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	20.2	16.6	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	187	126	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	7810	7700	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5530	5600	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.49	0.48	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	6.87	6.01	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	13300	13800	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	312	308	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11700	11900	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2351-A-11	BA2351-A-12	----	----	----
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23D0839-011	VA23D0839-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		311	164	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		303	214	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		10.3	12.1	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.38	3.38	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		51.4	54.5	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3610	4980	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.0	2.1	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.2	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		10.8	10.9	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.39	9.44	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		1.34	1.34	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1940	1900	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.557	0.528	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		78.5	75.3	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2351-A-11	BA2351-A-12	----	----	----
					Client sampling date / time	20-Dec-2023 09:00	20-Dec-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23D0839-011	VA23D0839-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		0.15	0.16	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		<0.50	<0.50	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23D0839**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Dec-2023 12:45
PO	: VANCO0000051998	Issue Date	: 03-Jan-2024 15:27
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA23D0839-001	BA2351-A-1	Copper	7440-50-8	E440	32.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Lithium	7439-93-2	E440	69.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Manganese	7439-96-5	E440	55.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Molybdenum	7439-98-7	E440	61.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Nickel	7440-02-0	E440	30.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Phosphorus	7723-14-0	E440	48.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23D0839-001	BA2351-A-1	Silver	7440-22-4	E440	64.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-1	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-10	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-11	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-12	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-2	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-3	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-4	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-5	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-6	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-7	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-8	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2351-A-9	E510	20-Dec-2023	29-Dec-2023	28 days	9 days	✓	02-Jan-2024	28 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-1	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-10	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-11	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-12	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-2	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-3	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-4	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-5	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-6	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-7	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-8	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2351-A-9	E440	20-Dec-2023	29-Dec-2023	180 days	9 days	✓	02-Jan-2024	180 days	13 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-1	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-10	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-11	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-12	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-2	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-3	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-4	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-5	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-6	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-7	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-8	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2351-A-9	E144	20-Dec-2023	----	----	----		28-Dec-2023	----	8 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-1	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-10	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-11	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-12	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-2	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-3	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-4	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-5	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-6	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-7	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-8	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2351-A-9	E108	20-Dec-2023	29-Dec-2023	30 days	9 days	✓	29-Dec-2023	30 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-1	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-10	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-11	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-12	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-2	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-3	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-4	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-5	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-6	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-7	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-8	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2351-A-9	E512	28-Dec-2023	03-Jan-2024	36 days	14 days	✓	03-Jan-2024	36 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-1	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-10	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-11	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-12	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-2	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-3	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-4	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-5	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-6	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-7	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-8	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2351-A-9	E444	28-Dec-2023	30-Dec-2023	188 days	10 days	✓	31-Dec-2023	188 days	11 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-1	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-10	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-11	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-12	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-2	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-3	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-4	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-5	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-6	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-7	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-8	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2351-A-9	EPP444	20-Dec-2023	28-Dec-2023	----	----		----	14 days	8 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	1290259	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1290260	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	1290262	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1290261	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1290259	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1290260	2	13	15.3	10.0	✓
Moisture Content by Gravimetry	E144	1290262	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1290261	1	13	7.6	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1291360	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1290259	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1291361	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1290260	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	1290262	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1291360	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1291361	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 ALS Environmental - Vancouver	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: **VA23D0839**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Dec-2023 12:45
PO	: VANCO0000051998	Date Analysis Commenced	: 28-Dec-2023
C-O-C number	: ----	Issue Date	: 03-Jan-2024 15:27
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ghazaleh Khanmirzaei	Analsyt	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1290261)											
VA23D0839-001	BA2351-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.2	0.3%	5%	----
Physical Tests (QC Lot: 1290262)											
VA23D0839-001	BA2351-A-1	Moisture	----	E144	0.25	%	23.3	22.8	2.46%	20%	----
Metals (QC Lot: 1290259)											
VA23D0839-001	BA2351-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.130	0.0738	0.0566	Diff <2x LOR	----
Metals (QC Lot: 1290260)											
VA23D0839-001	BA2351-A-1	Aluminum	7429-90-5	E440	50	mg/kg	37700	33200	12.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	167	168	0.683%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	22.2	25.3	13.3%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	594	594	0.0668%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	0.008	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	11.2	10.2	9.46%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	180	172	4.20%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	12.2	11.6	5.23%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	165000	185000	11.8%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	141	144	1.98%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	18.6	20.4	9.33%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	1810	2520	32.7%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	35600	42300	17.3%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	412	308	28.7%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	19.2	39.8	69.8%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	10900	12100	10.2%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	569	1000	55.1%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	16.9	31.8	61.1%	40%	DUP-H
		Nickel	7440-02-0	E440	0.50	mg/kg	139	102	30.7%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	7040	11600	48.9%	30%	DUP-H
		Potassium	7440-09-7	E440	100	mg/kg	5790	6180	6.49%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.58	0.59	0.01	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.27	10.3	64.9%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	14200	16100	12.4%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1290260) - continued											
VA23D0839-001	BA2351-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	325	333	2.56%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11400	12200	6.92%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.050	<0.050	0.0002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	146	140	4.00%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	247	190	26.2%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	8.51	7.27	15.8%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.45	3.61	4.71%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	50.7	48.8	3.84%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4240	4350	2.57%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.2	2.4	0.3	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1290262)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1290259)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1290260)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1290260) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 1291360)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1291361)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1290261)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1290262)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1290259)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	89.4	80.0	120	----
Metals (QCLot: 1290260)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.8	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	91.0	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.9	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.3	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	89.2	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	88.7	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	93.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.7	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.8	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	90.5	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	89.0	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	98.1	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	94.3	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	90.6	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	90.9	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	93.0	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	90.9	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	83.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	91.0	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	92.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.1	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1290260) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	88.9	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.5	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	92.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	90.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.2	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	95.2	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.8	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	91.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1291360)										
VA23D0839-001	BA2351-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	95.9	50.0	140	----
TCLP Metals (QCLot: 1291361)										
VA23D0839-001	BA2351-A-1	Antimony, TCLP	7440-36-0	E444	4.51 mg/L	5 mg/L	90.3	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.0 mg/L	12.5 mg/L	96.5	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.228 mg/L	0.25 mg/L	91.1	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.30 mg/L	10 mg/L	83.0	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.226 mg/L	0.25 mg/L	90.6	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.21 mg/L	1.25 mg/L	96.5	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.239 mg/L	0.25 mg/L	95.5	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.22 mg/L	2.5 mg/L	88.7	50.0	140	----
		Iron, TCLP	7439-89-6	E444	240 mg/L	250 mg/L	96.1	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.29 mg/L	10 mg/L	82.9	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	248 mg/L	250 mg/L	99.2	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.90 mg/L	5 mg/L	98.1	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.079 mg/L	0.1 mg/L	78.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.2 mg/L	5 mg/L	84.4	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.47 mg/L	5 mg/L	89.4	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.9	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.33 mg/L	10 mg/L	93.3	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	80.6	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1290259)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	96.3	70.0	130	----
Metals (QCLot: 1290260)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	97.6	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	85.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	92.8	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	93.5	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	96.7	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	88.0	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	91.1	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	103	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	91.8	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	87.8	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	96.9	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	89.0	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	94.8	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	96.2	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	98.7	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	88.9	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	90.5	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	84.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	99.8	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	93.2	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	91.1	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	91.5	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	78.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	102	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1290260) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	98.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	97.3	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	89.6	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	83.6	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	ofetherstonhaugh@covanta.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Request
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org			
					Sarah.Wellman@metrovancouver.org			
Invoice To	Same as Report ?			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:				
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
Lab Work Order # (lab use only)	D 0 8 3 9			ALS Contact:		Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE		Chrome 6		MET-CSR+FULL-VA (all metals)							Number of Containers
	BA2351-A-1	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-2	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-3	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-4	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-5	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-6	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-7	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-8	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-9	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-10	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-11	20-Dec-23	9:00	Soil	X	X				X							1
	BA2351-A-12	20-Dec-23	9:00	Soil	X	X				X							1

Environmental Division
Vancouver
Work Order Reference
VA23D0839

Telephone : +1 604 253 4188

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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 provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations Yes / No ? If Yes add SIF
	27-Dec-23	0800				°C		12/27/23	12:[illegible]	

GENF 20.00 Front