metrovancouver

Bottom Ash Data

2023 Week 35

The following analytical report represents bottom ash composite results for week 35 of 2023 (August 27, 2023 to September 2, 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	: **VA23C1068**	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	: 07-Sep-2023 11:30
PO	: VANCO0000051998	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: ----	Issue Date	: 14-Sep-2023 13:04
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*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	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	BA2335-A-1	BA2335-A-2	BA2335-A-3	BA2335-A-4	BA2335-A-5
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
						VA23C1068-001	VA23C1068-002	VA23C1068-003	VA23C1068-004	VA23C1068-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.6	22.7	20.7	20.9	21.2
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.0	12.0	12.0	11.9	11.9
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		36000	31200	29300	31500	30500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		79.4	124	114	108	144
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		18.5	25.4	23.8	23.4	29.7
Barium	7440-39-3	E440/VA	0.50	mg/kg		582	416	471	483	393
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.33	0.33	0.36	0.33	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		5.47	13.3	9.40	8.56	9.70
Boron	7440-42-8	E440/VA	5.0	mg/kg		289	204	154	199	203
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		6.42	13.7	10.8	30.3	12.5
Calcium	7440-70-2	E440/VA	50	mg/kg		121000	152000	144000	145000	141000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		192	149	207	176	156
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		26.0	116	45.6	70.9	71.3
Copper	7440-50-8	E440/VA	0.50	mg/kg		8550	6400	2940	3360	5320
Iron	7439-89-6	E440/VA	50	mg/kg		51800	41000	51300	76200	49200
Lead	7439-92-1	E440/VA	0.50	mg/kg		212	497	670	531	889
Lithium	7439-93-2	E440/VA	2.0	mg/kg		22.2	28.5	24.8	30.9	26.2
Magnesium	7439-95-4	E440/VA	20	mg/kg		9580	11500	11300	10900	10700
Manganese	7439-96-5	E440/VA	1.0	mg/kg		633	743	773	836	696
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.125	0.109	0.0515	0.490
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		37.5	46.3	44.0	110	39.3
Nickel	7440-02-0	E440/VA	0.50	mg/kg		635	136	230	130	331
Phosphorus	7723-14-0	E440/VA	50	mg/kg		12200	9360	10000	9570	8560
Potassium	7440-09-7	E440/VA	100	mg/kg		4970	5870	5380	5190	5820
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.46	0.43	0.42	0.40	0.70
Silver	7440-22-4	E440/VA	0.10	mg/kg		22.5	10.6	3.09	4.69	3.62
Sodium	7440-23-5	E440/VA	50	mg/kg		16300	15700	15600	15200	15000
Strontium	7440-24-6	E440/VA	0.50	mg/kg		312	302	274	284	286

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2335-A-1	BA2335-A-2	BA2335-A-3	BA2335-A-4	BA2335-A-5
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
						VA23C1068-001	VA23C1068-002	VA23C1068-003	VA23C1068-004	VA23C1068-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		9600	15800	13000	13400	13900
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		729	102	190	109	103
Titanium	7440-32-6	E440/VA	1.0	mg/kg		275	280	275	354	441
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		2.42	3.75	3.20	11.4	4.18
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.21	3.52	2.94	3.06	2.83
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		30.8	39.5	38.8	38.9	36.3
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4060	3870	3150	2910	7180
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.8	2.2	1.7	1.7	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.8	11.9	11.8	11.9	12.0
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.09	8.30	8.52	8.32	8.79
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.84	2.84	2.84	2.84	2.84
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.34	6.31	6.17	7.05	6.30
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		2.44	2.24	2.25	1.94	2.50
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.199	0.193	0.176	0.079	0.463
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2060	2090	2090	1740	2180
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		1.14	0.787	1.72	2.03	1.05
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.37	1.33	1.52	1.02	1.36
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		118	118	120	93.1	120
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		0.54	0.42	0.40	<0.25	0.41
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	BA2335-A-1	BA2335-A-2	BA2335-A-3	BA2335-A-4	BA2335-A-5
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C1068-001	VA23C1068-002	VA23C1068-003	VA23C1068-004	VA23C1068-005
						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	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		20.8	36.7	31.3	4.12	44.1
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	BA2335-A-6	BA2335-A-7	BA2335-A-8	BA2335-A-9	BA2335-A-10
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
						VA23C1068-006	VA23C1068-007	VA23C1068-008	VA23C1068-009	VA23C1068-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		22.5	22.2	22.7	22.2	21.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.0	12.0	12.0	12.0	12.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		34100	26600	39700	31500	35700
Antimony	7440-36-0	E440/VA	0.10	mg/kg		108	114	262	131	107
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		23.0	30.4	29.2	27.0	25.5
Barium	7440-39-3	E440/VA	0.50	mg/kg		435	429	488	492	524
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.39	0.36	0.38	0.38	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		11.8	8.94	12.4	9.10	10.1
Boron	7440-42-8	E440/VA	5.0	mg/kg		189	175	226	251	169
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		10.2	10.3	38.4	10.1	8.83
Calcium	7440-70-2	E440/VA	50	mg/kg		140000	143000	136000	144000	133000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		180	155	664	666	164
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		155	125	108	98.1	35.1
Copper	7440-50-8	E440/VA	0.50	mg/kg		5490	1390	8720	1690	4450
Iron	7439-89-6	E440/VA	50	mg/kg		64700	65700	75300	57100	78100
Lead	7439-92-1	E440/VA	0.50	mg/kg		422	669	368	350	977
Lithium	7439-93-2	E440/VA	2.0	mg/kg		37.7	24.8	32.1	25.8	22.9
Magnesium	7439-95-4	E440/VA	20	mg/kg		11200	11100	11000	12100	10500
Manganese	7439-96-5	E440/VA	1.0	mg/kg		953	735	871	852	751
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.252	0.0644	0.0529	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		40.4	44.0	44.4	42.2	45.3
Nickel	7440-02-0	E440/VA	0.50	mg/kg		186	169	546	775	144
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7680	8410	9110	8180	9150
Potassium	7440-09-7	E440/VA	100	mg/kg		5480	5680	5520	6140	5450
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.43	0.34	0.37	0.31	0.32
Silver	7440-22-4	E440/VA	0.10	mg/kg		10.7	3.36	>166	3.38	5.69
Sodium	7440-23-5	E440/VA	50	mg/kg		15800	14800	14600	17300	15100
Strontium	7440-24-6	E440/VA	0.50	mg/kg		297	283	298	307	262
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13000	13900	13100	14300	13600

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2335-A-6	BA2335-A-7	BA2335-A-8	BA2335-A-9	BA2335-A-10
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
						VA23C1068-006	VA23C1068-007	VA23C1068-008	VA23C1068-009	VA23C1068-010
						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		107	88.3	5990	91.1	128
Titanium	7440-32-6	E440/VA	1.0	mg/kg		472	332	520	588	375
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		5.31	4.07	5.49	4.59	3.05
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.79	2.91	2.60	3.02	2.85
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		38.8	40.7	39.8	43.1	36.1
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3450	3600	3930	6360	3940
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.0	1.9	2.4	1.5	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.9	11.9	11.9	11.9
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.70	8.68	8.38	8.49	8.43
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.84	2.84	2.84	2.84	2.84
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.42	6.35	6.44	6.52	7.70
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		2.39	2.41	2.42	2.45	2.14
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.185	0.147	0.144	0.324	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2160	2110	2110	2050	1680
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		1.69	1.09	0.955	1.20	0.220
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.78	1.63	1.36	1.31	0.905
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		122	118	119	122	88.6
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		0.43	0.39	0.41	0.35	<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	BA2335-A-6	BA2335-A-7	BA2335-A-8	BA2335-A-9	BA2335-A-10
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00	30-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C1068-006	VA23C1068-007	VA23C1068-008	VA23C1068-009	VA23C1068-010
						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	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		25.7	29.8	26.9	17.5	<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	BA2335-A-11	BA2335-A-12	----	----	----
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	----	----	----
						VA23C1068-011	VA23C1068-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.3	22.2	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.0	12.0	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		27100	34100	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		140	110	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		26.9	27.2	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		460	512	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.43	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		13.4	11.2	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		178	186	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		13.6	27.8	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		138000	144000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		158	174	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		80.1	155	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		3980	2460	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		71500	56600	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		388	434	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		23.4	27.5	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		11300	11700	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		783	1140	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0845	0.0517	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		41.5	48.3	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		139	238	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8760	9000	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		5220	5500	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.82	0.36	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.95	5.62	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		14300	16000	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		270	291	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13000	14300	----	----	----

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2335-A-11	BA2335-A-12	----	----	----
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	----	----	----
						VA23C1068-011	VA23C1068-012	--------	--------	--------
						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		186	114	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		346	461	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		2.79	3.55	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.94	3.01	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		39.6	40.2	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		5450	3390	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.7	2.0	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.9	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.40	8.56	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.84	2.84	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.28	6.39	----	----	----
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		2.32	2.28	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.178	0.177	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2080	2020	----	----	----
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		1.15	1.37	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.66	1.43	----	----	----
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		120	117	----	----	----
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		0.37	0.50	----	----	----
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	BA2335-A-11	BA2335-A-12	----	----	----
					Client sampling date / time	30-Aug-2023 09:00	30-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C1068-011	VA23C1068-012	--------	--------	--------
						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	<0.15	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		27.6	26.7	----	----	----
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	: **VA23C1068**	Page	: 1 of 17
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	: 07-Sep-2023 11:30
PO	: VANCO0000051998	Issue Date	: 14-Sep-2023 13:03
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)

- Analysis Holding Time Outliers exist - please see following pages for full details.

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	VA23C1068-001	BA2335-A-1	Antimony	7440-36-0	E440	31.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Bismuth	7440-69-9	E440	41.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Boron	7440-42-8	E440	30.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Cadmium	7440-43-9	E440	73.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Chromium	7440-47-3	E440	59.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Cobalt	7440-48-4	E440	98.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Copper	7440-50-8	E440	126 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Iron	7439-89-6	E440	71.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Lead	7439-92-1	E440	51.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Lithium	7439-93-2	E440	46.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Nickel	7440-02-0	E440	113 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Phosphorus	7723-14-0	E440	32.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Silver	7440-22-4	E440	144 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Sulfur	7704-34-9	E440	34.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Tin	7440-31-5	E440	152 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Titanium	7440-32-6	E440	49.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C1068-001	BA2335-A-1	Mercury	7439-97-6	E510	0.154 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment

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 / 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 BA2335-A-1	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-10	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-11	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-12	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-2	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-3	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-4	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2335-A-5	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-6	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-7	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-8	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2335-A-9	E510	30-Aug-2023	13-Sep-2023	28 days	14 days	✓	13-Sep-2023	28 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-1	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-10	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-11	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-12	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2335-A-2	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-3	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-4	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-5	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-6	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-7	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-8	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2335-A-9	E440	30-Aug-2023	13-Sep-2023	180 days	14 days	✓	14-Sep-2023	180 days	14 days	× EHT
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-1	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2335-A-10	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-11	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-12	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-2	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-3	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-4	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-5	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-6	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-7	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2335-A-8	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2335-A-9	E144	30-Aug-2023	----	----	----		12-Sep-2023	----	13 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-1	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-10	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-11	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-12	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-2	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-3	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-4	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2335-A-5	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-6	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-7	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-8	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2335-A-9	E108	30-Aug-2023	13-Sep-2023	30 days	14 days	✓	13-Sep-2023	30 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-1	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-10	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-11	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-12	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / 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) BA2335-A-2	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-3	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-4	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-5	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-6	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-7	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-8	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2335-A-9	E512	08-Sep-2023	09-Sep-2023	37 days	10 days	✓	09-Sep-2023	37 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-1	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT

Matrix: **Soil/Solid**

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

Analyte Group / 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) BA2335-A-10	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-11	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-12	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-2	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-3	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-4	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-5	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-6	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-7	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT

Matrix: **Soil/Solid**

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

Analyte Group / 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) BA2335-A-8	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2335-A-9	E444	08-Sep-2023	09-Sep-2023	189 days	10 days	✓	10-Sep-2023	189 days	11 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-1	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-10	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-11	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-12	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-2	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-3	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-4	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT

Matrix: **Soil/Solid**

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

Analyte Group / 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 : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-5	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-6	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-7	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-8	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2335-A-9	EPP444	30-Aug-2023	08-Sep-2023	----	----		----	28 days	8 days	× EHT

Legend & Qualifier Definitions

EHT: Exceeded ALS recommended hold time prior to analysis.

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	1130332	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1130331	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1130334	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1130333	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1130332	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1130331	2	19	10.5	10.0	✓
Moisture Content by Gravimetry	E144	1130334	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1130333	1	15	6.6	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1125976	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1130332	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1125977	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1130331	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1130334	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1125976	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1125977	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	: **VA23C1068**	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	: 07-Sep-2023 11:30
PO	: VANCO0000051998	Date Analysis Commenced	: 08-Sep-2023
C-O-C number	: ----	Issue Date	: 14-Sep-2023 13:06
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*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	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: 1130333)											
KS2303386-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	9.14	9.20	0.7%	5%	----
Physical Tests (QC Lot: 1130334)											
VA23C1068-001	BA2335-A-1	Moisture	----	E144	0.25	%	21.6	20.1	7.01%	20%	----
Metals (QC Lot: 1130331)											
VA23C1068-001	BA2335-A-1	Aluminum	7429-90-5	E440	50	mg/kg	36000	35800	0.632%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	79.4	109	31.2%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	18.5	22.1	17.6%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	582	504	14.3%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.34	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	5.47	8.29	41.0%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	289	214	30.0%	30%	DUP-H
		Cadmium	7440-43-9	E440	0.020	mg/kg	6.42	13.8	73.0%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	121000	137000	12.1%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	192	104	59.6%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	26.0	76.1	98.1%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	8550	1930	126%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	51800	24600	71.1%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	212	360	51.5%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	22.2	35.6	46.2%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	9580	11800	20.8%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	633	586	7.68%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	37.5	43.9	15.8%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	635	177	113%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	12200	8830	32.4%	30%	DUP-H
		Potassium	7440-09-7	E440	100	mg/kg	4970	5540	10.9%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.38	0.09	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	22.5	3.65	144%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	16300	14800	9.53%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	312	268	15.1%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	9600	13700	34.9%	30%	DUP-H

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: 1130331) - continued											
VA23C1068-001	BA2335-A-1	Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	729	98.3	152%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	275	454	49.3%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	2.42	2.47	0.05	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.21	2.79	23.5%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	30.8	34.7	11.9%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4060	3440	16.7%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.8	1.8	1.0	Diff <2x LOR	----
Metals (QC Lot: 1130332)											
VA23C1068-001	BA2335-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	# 0.204	0.154	Diff <2x LOR	DUP-H

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: 1130334)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1130331)						
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	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1130331) - continued						
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	----
Metals (QCLot: 1130332)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1125976)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1125977)						
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: 1130333)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
Physical Tests (QCLot: 1130334)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1130331)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.0	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.6	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.0	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.3	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	93.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.7	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.2	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.6	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	97.4	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.1	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.7	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.8	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: 1130331) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.0	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	102	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	97.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	96.8	80.0	120	----
Metals (QCLot: 1130332)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.6	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: 1125976)										
VA23C1068-001	BA2335-A-1	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	93.4	50.0	140	----
TCLP Metals (QCLot: 1125977)										
VA23C1068-001	BA2335-A-1	Antimony, TCLP	7440-36-0	E444	4.32 mg/L	5 mg/L	86.4	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.4 mg/L	5 mg/L	88.7	50.0	140	----
		Barium, TCLP	7440-39-3	E444	10.4 mg/L	12.5 mg/L	82.8	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.213 mg/L	0.25 mg/L	85.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.15 mg/L	10 mg/L	81.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.216 mg/L	0.25 mg/L	86.3	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	1.05 mg/L	1.25 mg/L	84.4	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	1.98 mg/L	2.5 mg/L	79.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	196 mg/L	250 mg/L	78.6	50.0	140	----
		Lead, TCLP	7439-92-1	E444	7.92 mg/L	10 mg/L	79.2	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	223 mg/L	250 mg/L	89.1	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.03 mg/L	2.5 mg/L	81.3	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.12 mg/L	5 mg/L	82.4	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.077 mg/L	0.1 mg/L	77.0	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.1 mg/L	5 mg/L	81.8	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.52 mg/L	5 mg/L	90.4	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.62 mg/L	0.75 mg/L	82.9	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	81.6	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: 1130331)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	108	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	97.5	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	117	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	105	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	103	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	101	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	107	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	91.7	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	109	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: 1130331) - continued									
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	101	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	91.6	70.0	130	----
Metals (QCLot: 1130332)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	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	
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)		ALS Contact:	Sampler:

Please indicate below Filtered, Preserved or both (F, P, F/P)

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
	BA2335-A-1	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-2	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-3	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-4	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-5	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-6	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-7	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-8	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-9	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-10	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-11	30-Aug-23	9:00	Soil	X	X				X							1
	BA2335-A-12	30-Aug-23	9:00	Soil	X	X				X							1

Environmental Division
Vancouver
Work Order Reference
VA23C1068

Telephone : +1 604 253 4188

Special Instructio[...] (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
[signature]	7-Sept-23	[illegible]	CW	6/09/23	11:30	22 °C				

GENF 20.00 Front