Bottom Ash Data

2023 Week 13

The following analytical report represents bottom ash composite results for week 13 of 2023 (March 26, 2023 to April 1, 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	: **VA23A7275**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 05-Apr-2023 13:25
PO	: VANCO0000051998	Date Analysis Commenced	: 06-Apr-2023
C-O-C number	: ----	Issue Date	: 17-Apr-2023 09:30
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*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-1	BA2313-A-2	BA2313-A-3	BA2313-A-4	BA2313-A-5
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-001	VA23A7275-002	VA23A7275-003	VA23A7275-004	VA23A7275-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		21.2	23.6	21.8	21.9	21.7
pH (1:2 soil:water)	----	E108	0.10	pH units		12.3	12.2	12.4	12.2	12.3
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		46300	43100	38800	29700	29300
Antimony	7440-36-0	E440	0.10	mg/kg		204	170	175	170	193
Arsenic	7440-38-2	E440	0.10	mg/kg		23.4	26.3	21.9	25.7	23.2
Barium	7440-39-3	E440	0.50	mg/kg		531	535	534	464	476
Beryllium	7440-41-7	E440	0.10	mg/kg		0.36	0.38	0.39	0.33	0.37
Bismuth	7440-69-9	E440	0.20	mg/kg		14.6	45.5	13.9	155	14.6
Boron	7440-42-8	E440	5.0	mg/kg		244	221	232	195	168
Cadmium	7440-43-9	E440	0.020	mg/kg		13.6	44.0	14.8	280	17.5
Calcium	7440-70-2	E440	50	mg/kg		157000	157000	155000	160000	158000
Chromium	7440-47-3	E440	0.50	mg/kg		219	179	162	231	172
Cobalt	7440-48-4	E440	0.10	mg/kg		34.1	30.0	62.8	74.7	59.9
Copper	7440-50-8	E440	0.50	mg/kg		1700	2110	2830	1260	2780
Iron	7439-89-6	E440	50	mg/kg		61000	60100	45400	64600	51300
Lead	7439-92-1	E440	0.50	mg/kg		773	499	356	729	603
Lithium	7439-93-2	E440	2.0	mg/kg		23.1	20.2	25.3	22.6	34.0
Magnesium	7439-95-4	E440	20	mg/kg		11200	11600	10000	10200	12600
Manganese	7439-96-5	E440	1.0	mg/kg		772	759	600	855	713
Mercury	7439-97-6	E510	0.0500	mg/kg		0.0876	0.115	0.116	0.0954	0.115
Molybdenum	7439-98-7	E440	0.10	mg/kg		19.8	17.7	15.4	19.4	19.1
Nickel	7440-02-0	E440	0.50	mg/kg		105	165	286	162	109
Phosphorus	7723-14-0	E440	50	mg/kg		8650	10500	9540	10500	9000
Potassium	7440-09-7	E440	100	mg/kg		6810	6790	6610	6860	7410
Selenium	7782-49-2	E440	0.20	mg/kg		0.52	0.61	0.59	0.53	0.63
Silver	7440-22-4	E440.Ag	0.10	mg/kg		----	----	----	16.5	----
Silver	7440-22-4	E440	0.10	mg/kg		7.62	6.74	7.31	----	6.59
Sodium	7440-23-5	E440	50	mg/kg		17300	17200	16400	17300	19300

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-1	BA2313-A-2	BA2313-A-3	BA2313-A-4	BA2313-A-5
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-001	VA23A7275-002	VA23A7275-003	VA23A7275-004	VA23A7275-005
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.50	mg/kg		323	306	305	316	316
Sulfur	7704-34-9	E440	1000	mg/kg		13700	13600	12400	13200	13500
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440	2.0	mg/kg		161	170	148	182	145
Titanium	7440-32-6	E440	1.0	mg/kg		608	417	524	296	501
Tungsten	7440-33-7	E440	0.50	mg/kg		10.7	13.2	11.5	12.3	12.8
Uranium	7440-61-1	E440	0.050	mg/kg		2.76	3.14	2.90	3.00	3.05
Vanadium	7440-62-2	E440	0.20	mg/kg		38.8	40.0	37.6	38.1	37.9
Zinc	7440-66-6	E440	2.0	mg/kg		5120	4340	4670	4470	4190
Zirconium	7440-67-7	E440	1.0	mg/kg		1.6	1.4	1.2	1.9	1.1
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.1	12.4	12.3	12.3	12.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.27	9.18	9.25	8.62	8.15
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		7.91	7.82	7.50	7.09	7.63
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444	0.50	mg/L		1.95	2.00	2.00	2.08	2.04
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	<0.050	0.056	0.140	0.074
Calcium, TCLP	7440-70-2	E444	10	mg/L		2330	2340	2350	2300	2330
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.132	0.178	0.257	0.788	0.274
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.343	0.399	0.368	0.334	0.563
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		107	110	115	117	113
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	<0.25	<0.25	0.33	<0.25

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-1	BA2313-A-2	BA2313-A-3	BA2313-A-4	BA2313-A-5
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-001	VA23A7275-002	VA23A7275-003	VA23A7275-004	VA23A7275-005
						Result	Result	Result	Result	Result
TCLP Metals										
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	<0.50	<0.50	8.38	1.67
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-6	BA2313-A-7	BA2313-A-8	BA2313-A-9	BA2313-A-10
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-006	VA23A7275-007	VA23A7275-008	VA23A7275-009	VA23A7275-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		22.2	23.1	22.3	21.8	21.6
pH (1:2 soil:water)	----	E108	0.10	pH units		12.2	12.2	12.3	12.3	12.4
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		24800	36100	33700	49700	39800
Antimony	7440-36-0	E440	0.10	mg/kg		188	206	246	152	187
Arsenic	7440-38-2	E440	0.10	mg/kg		28.9	26.5	33.5	22.6	23.8
Barium	7440-39-3	E440	0.50	mg/kg		393	493	505	516	504
Beryllium	7440-41-7	E440	0.10	mg/kg		0.35	0.36	0.38	0.33	0.34
Bismuth	7440-69-9	E440	0.20	mg/kg		14.4	16.9	19.1	15.4	15.1
Boron	7440-42-8	E440	5.0	mg/kg		185	172	216	276	128
Cadmium	7440-43-9	E440	0.020	mg/kg		14.9	16.5	24.8	13.6	17.9
Calcium	7440-70-2	E440	50	mg/kg		158000	166000	184000	140000	161000
Chromium	7440-47-3	E440	0.50	mg/kg		162	172	180	242	159
Cobalt	7440-48-4	E440	0.10	mg/kg		61.1	26.1	134	27.6	33.7
Copper	7440-50-8	E440	0.50	mg/kg		2700	1220	2280	1710	1610
Iron	7439-89-6	E440	50	mg/kg		43400	43200	37200	55300	37200
Lead	7439-92-1	E440	0.50	mg/kg		327	394	568	289	350
Lithium	7439-93-2	E440	2.0	mg/kg		23.0	22.1	23.3	18.7	20.4
Magnesium	7439-95-4	E440	20	mg/kg		10400	11200	13500	9350	10200
Manganese	7439-96-5	E440	1.0	mg/kg		623	664	1180	878	671
Mercury	7439-97-6	E510	0.0500	mg/kg		0.0950	0.133	0.149	0.0756	0.112
Molybdenum	7439-98-7	E440	0.10	mg/kg		19.7	24.2	34.5	44.0	18.1
Nickel	7440-02-0	E440	0.50	mg/kg		184	176	221	139	115
Phosphorus	7723-14-0	E440	50	mg/kg		10600	11700	11700	11000	10700
Potassium	7440-09-7	E440	100	mg/kg		7100	7710	8510	6330	6680
Selenium	7782-49-2	E440	0.20	mg/kg		0.48	0.55	0.73	0.43	0.67
Silver	7440-22-4	E440	0.10	mg/kg		6.74	14.8	8.70	7.14	8.04
Sodium	7440-23-5	E440	50	mg/kg		17200	18900	20200	16800	16900
Strontium	7440-24-6	E440	0.50	mg/kg		331	318	363	280	315
Sulfur	7704-34-9	E440	1000	mg/kg		13100	13500	16100	10500	12300

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-6	BA2313-A-7	BA2313-A-8	BA2313-A-9	BA2313-A-10
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-006	VA23A7275-007	VA23A7275-008	VA23A7275-009	VA23A7275-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	0.050	<0.050	0.060
Tin	7440-31-5	E440	2.0	mg/kg		149	148	237	130	423
Titanium	7440-32-6	E440	1.0	mg/kg		204	386	404	609	352
Tungsten	7440-33-7	E440	0.50	mg/kg		11.6	16.4	15.5	14.3	19.2
Uranium	7440-61-1	E440	0.050	mg/kg		3.38	3.38	3.84	2.55	3.18
Vanadium	7440-62-2	E440	0.20	mg/kg		37.0	39.1	45.5	42.4	38.8
Zinc	7440-66-6	E440	2.0	mg/kg		4310	4900	6110	3800	9810
Zirconium	7440-67-7	E440	1.0	mg/kg		1.3	1.2	1.2	1.8	1.8
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.4	12.3	12.2	12.1	12.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.88	6.16	5.54	6.00	5.59
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		7.35	7.73	7.69	7.44	7.84
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444	0.50	mg/L		2.11	1.89	2.10	1.98	1.92
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.089	<0.050	0.104	0.074	0.051
Calcium, TCLP	7440-70-2	E444	10	mg/L		2370	2270	2400	2310	2300
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.548	0.218	0.278	0.873	0.178
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.416	0.402	0.446	0.407	0.386
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		118	112	112	114	110
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.29	<0.25	<0.25	0.31	<0.25
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-6	BA2313-A-7	BA2313-A-8	BA2313-A-9	BA2313-A-10
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00	29-Mar-2023 09:00
						VA23A7275-006	VA23A7275-007	VA23A7275-008	VA23A7275-009	VA23A7275-010
						Result	Result	Result	Result	Result
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		1.69	<0.50	<0.50	1.43	<0.50
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2313-A-11	BA2313-A-12	----	----	----
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	----	----	----
						VA23A7275-011	VA23A7275-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%		22.9	21.9	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		12.2	12.2	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		29600	50400	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		162	178	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		19.5	37.5	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		474	433	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.34	0.54	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		114	13.0	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		188	144	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		13.9	15.5	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		148000	148000	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		138	157	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		25.3	83.9	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		1280	1790	----	----	----
Iron	7439-89-6	E440	50	mg/kg		39800	48200	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		466	331	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		19.2	25.3	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		10700	10200	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		569	924	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.110	0.0912	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		16.2	21.9	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		105	174	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		8890	9490	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		7460	6740	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		0.45	0.58	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		6.57	7.82	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		18000	15500	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		395	308	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		12100	12800	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2313-A-11	BA2313-A-12	----	----	----
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7275-011	VA23A7275-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		121	142	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		314	508	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		10.6	14.2	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		2.94	3.01	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		36.0	42.2	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		3510	4140	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		1.2	4.0	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.2	12.2	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.03	5.87	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		7.55	7.76	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L		1.98	1.97	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.069	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		2290	2370	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.259	0.268	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.370	0.394	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L		111	111	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2313-A-11	BA2313-A-12	----	----	----
					Client sampling date / time	29-Mar-2023 09:00	29-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7275-011	VA23A7275-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	<0.50	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	----	----	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7275**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 05-Apr-2023 13:25
PO	: VANCO0000051998	Issue Date	: 17-Apr-2023 09:30
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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) 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	VA23A7275-001	BA2313-A-1	Aluminum	7429-90-5	E440	53.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Boron	7440-42-8	E440	56.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Cadmium	7440-43-9	E440	31.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Chromium	7440-47-3	E440	43.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Cobalt	7440-48-4	E440	134 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Lead	7439-92-1	E440	69.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Titanium	7440-32-6	E440	61.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A7275-001	BA2313-A-1	Tungsten	7440-33-7	E440	34.3 % DUP-H	30%	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.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-8896980 02	----	Silver	7440-22-4	E440	79.2 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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 : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-4	E440.Ag	29-Mar-2023	10-Apr-2023	180 days	12 days	✓	10-Apr-2023	168 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-1	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-10	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-11	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-12	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-2	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-3	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 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 BA2313-A-4	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-5	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-6	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-7	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-8	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2313-A-9	E510	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	28 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-1	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-10	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-11	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 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 : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-12	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-2	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-3	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-4	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-5	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-6	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-7	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-8	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2313-A-9	E440	29-Mar-2023	07-Apr-2023	----	----		09-Apr-2023	180 days	11 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 BA2313-A-1	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-10	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-11	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-12	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-2	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-3	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-4	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-5	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-6	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	

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 BA2313-A-7	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-8	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2313-A-9	E144	29-Mar-2023	----	----	----		06-Apr-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-1	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-10	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-11	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-12	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-2	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-3	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 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 BA2313-A-4	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-5	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-6	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-7	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-8	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2313-A-9	E108	29-Mar-2023	07-Apr-2023	----	----		08-Apr-2023	30 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-1	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-10	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-11	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-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
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-12	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-2	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-3	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-4	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-5	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-6	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-7	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-8	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-2023	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2313-A-9	E512	06-Apr-2023	12-Apr-2023	----	----		12-Apr-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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-1	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-10	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-11	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-12	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-2	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-3	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-4	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-5	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-6	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-7	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-8	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2313-A-9	E444	06-Apr-2023	12-Apr-2023	----	----		13-Apr-2023	180 days	15 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-1	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-10	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-11	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-12	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-2	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-3	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	

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) BA2313-A-4	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-5	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-6	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-7	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-8	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2313-A-9	EPP444	29-Mar-2023	06-Apr-2023	----	----		----	----	----	

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	889698	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	889699	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	889701	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	889700	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	891485	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	889698	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	889699	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	889701	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	889700	1	12	8.3	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	891485	1	1	100.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	893393	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	889698	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	893394	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	889699	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	889701	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	893393	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	893394	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 Vancouver - Environmental	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 Vancouver - Environmental	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 Vancouver - Environmental	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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	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 Vancouver - Environmental	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 Vancouver - Environmental	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

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	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.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	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.
Digestion for Silver	EP440.Ag Vancouver - Environmental	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 Vancouver - Environmental	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	: **VA23A7275**	Page	: 1 of 12
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 05-Apr-2023 13:25
PO	: VANCO0000051998	Date Analysis Commenced	: 06-Apr-2023
C-O-C number	: ----	Issue Date	: 17-Apr-2023 09:30
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*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	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: 889700)											
VA23A7275-001	BA2313-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.3	0.1%	5%	----
Physical Tests (QC Lot: 889701)											
VA23A7275-001	BA2313-A-1	Moisture	----	E144	0.25	%	21.2	22.0	3.37%	20%	----
Metals (QC Lot: 889698)											
VA23A7275-001	BA2313-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0876	0.151	0.0632	Diff <2x LOR	----
Metals (QC Lot: 889699)											
VA23A7275-001	BA2313-A-1	Aluminum	7429-90-5	E440	50	mg/kg	46300	26900	53.1%	40%	DUP-H
		Antimony	7440-36-0	E440	0.10	mg/kg	204	176	14.8%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	23.4	22.2	5.27%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	531	517	2.55%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.36	0.006	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	14.6	13.0	11.4%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	244	137	56.3%	30%	DUP-H
		Cadmium	7440-43-9	E440	0.020	mg/kg	13.6	18.6	31.2%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	157000	148000	6.04%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	219	141	43.6%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	34.1	171	134%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1700	1340	24.0%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	61000	45300	29.6%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	773	373	69.8%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	23.1	25.2	8.55%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11200	10600	5.49%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	772	606	24.1%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	19.8	19.8	0.0318%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	105	142	29.3%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	8650	10000	14.6%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	6810	6850	0.561%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.52	0.60	0.08	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	7.62	6.66	13.5%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	17300	16700	3.69%	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: 889699) - continued											
VA23A7275-001	BA2313-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	323	292	10.2%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	13700	12400	10.1%	30%	----
		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	161	136	16.8%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	608	322	61.3%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	10.7	15.1	34.3%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	2.76	2.92	5.57%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	38.8	41.8	7.57%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	5120	4540	12.0%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.1	0.6	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: 889701)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 889698)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 889699)						
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: 889699) - 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	----
Metals (QCLot: 891485)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 893393)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 893394)						
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: 889700)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
Physical Tests (QCLot: 889701)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 889698)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.0	80.0	120	----
Metals (QCLot: 889699)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.7	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	101	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.7	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	93.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	87.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.2	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.6	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.1	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	96.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100.0	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	98.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.4	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.2	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	# 79.2	80.0	120	MES
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100.0	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.2	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	88.6	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: 889699) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	93.9	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	92.0	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	95.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.9	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	90.9	80.0	120	----
Metals (QCLot: 891485)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	93.3	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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: 893393)										
VA23A7275-001	BA2313-A-1	Mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	108	50.0	140	----
TCLP Metals (QCLot: 893394)										
VA23A7275-001	BA2313-A-1	Antimony, TCLP	7440-36-0	E444	4.87 mg/L	5 mg/L	97.5	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.0	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.7 mg/L	12.5 mg/L	93.7	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.226 mg/L	0.25 mg/L	90.4	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.75 mg/L	10 mg/L	87.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.221 mg/L	0.25 mg/L	88.3	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	1.08 mg/L	1.25 mg/L	86.4	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.208 mg/L	0.25 mg/L	83.1	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.07 mg/L	2.5 mg/L	82.8	50.0	140	----
		Iron, TCLP	7439-89-6	E444	212 mg/L	250 mg/L	84.8	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.80 mg/L	10 mg/L	88.0	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	233 mg/L	250 mg/L	93.2	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.11 mg/L	2.5 mg/L	84.4	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.58 mg/L	5 mg/L	91.7	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.096 mg/L	0.1 mg/L	95.9	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	87.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.46 mg/L	5 mg/L	89.3	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.67 mg/L	0.75 mg/L	89.4	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	8.89 mg/L	10 mg/L	88.9	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	85.2	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: 889698)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 889699)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	103	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	99.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	95.5	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	109	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.5	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	99.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	105	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	98.0	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.6	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	97.4	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	117	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	97.8	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	108	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	99.1	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	96.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	90.5	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	110	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Reference Material (RM) Report: Qualifier
Metals (QCLot: 889699) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	93.6	70.0	130	----

ALS Environmental

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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:	rjohnson4@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)	VA23A7275			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
	BA2313-A-1	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-2	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-3	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-4	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-5	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-6	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-7	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-8	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-9	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-10	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-11	29-Mar-23	9:00	Soil	X	X		X	1
	BA2313-A-12	29-Mar-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23A7275

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
	5-APR-23	08a	JC	5Apr23	13:25	18 °C				