Bottom Ash Data

2023 Week 12

The following analytical report represents bottom ash composite results for week 12 of 2023 (March 19, 2023 to March 25, 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	: **VA23A6577**	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	: 28-Mar-2023 12:30
PO	: VANCO0000051998	Date Analysis Commenced	: 28-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 15:08
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*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-1	BA2312-A-2	BA2312-A-3	BA2312-A-4	BA2312-A-5
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-001	VA23A6577-002	VA23A6577-003	VA23A6577-004	VA23A6577-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		24.1	22.8	24.4	24.9	23.2
pH (1:2 soil:water)	----	E108	0.10	pH units		12.0	12.0	12.0	12.0	11.9
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		35400	40400	40600	35000	32000
Antimony	7440-36-0	E440	0.10	mg/kg		246	244	238	255	242
Arsenic	7440-38-2	E440	0.10	mg/kg		31.6	30.6	28.9	37.7	30.8
Barium	7440-39-3	E440	0.50	mg/kg		574	664	582	562	584
Beryllium	7440-41-7	E440	0.10	mg/kg		0.40	0.42	0.36	0.43	0.41
Bismuth	7440-69-9	E440	0.20	mg/kg		14.4	16.3	17.2	15.5	14.9
Boron	7440-42-8	E440	5.0	mg/kg		225	195	178	217	242
Cadmium	7440-43-9	E440	0.020	mg/kg		16.3	16.8	16.1	18.9	20.4
Calcium	7440-70-2	E440	50	mg/kg		190000	199000	183000	206000	199000
Chromium	7440-47-3	E440	0.50	mg/kg		177	185	157	192	152
Cobalt	7440-48-4	E440	0.10	mg/kg		77.6	164	42.4	70.4	99.8
Copper	7440-50-8	E440	0.50	mg/kg		1910	1340	4430	2860	2150
Iron	7439-89-6	E440	50	mg/kg		48400	57600	58900	59600	47300
Lead	7439-92-1	E440	0.50	mg/kg		824	518	417	1680	413
Lithium	7439-93-2	E440	2.0	mg/kg		28.5	33.4	26.2	30.4	31.7
Magnesium	7439-95-4	E440	20	mg/kg		12300	13800	12300	13600	12200
Manganese	7439-96-5	E440	1.0	mg/kg		805	749	818	892	701
Mercury	7439-97-6	E510	0.0500	mg/kg		0.130	0.143	0.168	0.169	0.145
Molybdenum	7439-98-7	E440	0.10	mg/kg		31.7	25.4	22.0	24.6	26.7
Nickel	7440-02-0	E440	0.50	mg/kg		314	141	132	143	684
Phosphorus	7723-14-0	E440	50	mg/kg		11100	12300	11200	12800	13100
Potassium	7440-09-7	E440	100	mg/kg		6580	7210	7030	7630	6940
Selenium	7782-49-2	E440	0.20	mg/kg		0.82	0.76	0.71	0.77	0.73
Silver	7440-22-4	E440	0.10	mg/kg		8.13	7.91	8.79	8.83	12.4
Sodium	7440-23-5	E440	50	mg/kg		17000	17900	17800	19000	17200
Strontium	7440-24-6	E440	0.50	mg/kg		339	352	380	381	364

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-1	BA2312-A-2	BA2312-A-3	BA2312-A-4	BA2312-A-5
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-001	VA23A6577-002	VA23A6577-003	VA23A6577-004	VA23A6577-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg		13400	13600	12900	14600	13800
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	0.052	<0.050	0.053	<0.050
Tin	7440-31-5	E440	2.0	mg/kg		201	210	203	400	206
Titanium	7440-32-6	E440	1.0	mg/kg		259	581	424	340	346
Tungsten	7440-33-7	E440	0.50	mg/kg		13.7	22.0	17.4	20.7	17.1
Uranium	7440-61-1	E440	0.050	mg/kg		2.97	3.36	2.98	3.40	3.28
Vanadium	7440-62-2	E440	0.20	mg/kg		38.0	44.3	39.0	46.1	39.5
Zinc	7440-66-6	E440	2.0	mg/kg		12100	5030	5020	5260	5260
Zirconium	7440-67-7	E440	1.0	mg/kg		2.6	1.9	2.2	2.4	2.0
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.2	12.2	12.2	12.2	12.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.17	6.08	6.43	8.87	9.53
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		8.14	8.19	8.05	8.23	8.30
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		1.56	1.65	1.67	1.62	1.81
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444	10	mg/L		2250	2290	2270	2290	2360
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		0.092	0.082	0.137	0.129	0.070
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.557	0.498	0.442	0.457	0.507
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		97.0	101	105	102	104
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	<0.25	<0.25
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-1	BA2312-A-2	BA2312-A-3	BA2312-A-4	BA2312-A-5
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-001	VA23A6577-002	VA23A6577-003	VA23A6577-004	VA23A6577-005
						Result	Result	Result	Result	Result
TCLP Metals										
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	<0.50	<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/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-6	BA2312-A-7	BA2312-A-8	BA2312-A-9	BA2312-A-10
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-006	VA23A6577-007	VA23A6577-008	VA23A6577-009	VA23A6577-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		23.2	24.9	23.9	23.2	23.8
pH (1:2 soil:water)	----	E108	0.10	pH units		11.9	12.0	11.9	11.9	11.9
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		61800	39900	34900	45200	35300
Antimony	7440-36-0	E440	0.10	mg/kg		238	212	219	276	210
Arsenic	7440-38-2	E440	0.10	mg/kg		33.2	26.6	26.2	38.2	29.1
Barium	7440-39-3	E440	0.50	mg/kg		649	664	634	730	565
Beryllium	7440-41-7	E440	0.10	mg/kg		0.42	0.39	0.46	0.47	0.36
Bismuth	7440-69-9	E440	0.20	mg/kg		17.9	14.9	12.9	21.8	29.8
Boron	7440-42-8	E440	5.0	mg/kg		221	199	196	225	184
Cadmium	7440-43-9	E440	0.020	mg/kg		24.2	15.6	15.0	17.8	17.4
Calcium	7440-70-2	E440	50	mg/kg		205000	187000	172000	223000	180000
Chromium	7440-47-3	E440	0.50	mg/kg		584	786	145	261	175
Cobalt	7440-48-4	E440	0.10	mg/kg		85.9	141	88.6	83.6	207
Copper	7440-50-8	E440	0.50	mg/kg		4350	2450	5580	1890	16300
Iron	7439-89-6	E440	50	mg/kg		67000	84100	78500	65400	55200
Lead	7439-92-1	E440	0.50	mg/kg		637	3210	5620	930	458
Lithium	7439-93-2	E440	2.0	mg/kg		31.2	30.3	24.9	33.4	30.1
Magnesium	7439-95-4	E440	20	mg/kg		12600	12800	11200	15300	12200
Manganese	7439-96-5	E440	1.0	mg/kg		1250	828	902	883	786
Mercury	7439-97-6	E510	0.0500	mg/kg		0.193	0.121	0.159	0.136	0.149
Molybdenum	7439-98-7	E440	0.10	mg/kg		23.7	32.0	21.8	28.6	19.6
Nickel	7440-02-0	E440	0.50	mg/kg		304	568	111	163	177
Phosphorus	7723-14-0	E440	50	mg/kg		11800	13100	9670	14400	10900
Potassium	7440-09-7	E440	100	mg/kg		7970	6290	6300	9190	7190
Selenium	7782-49-2	E440	0.20	mg/kg		0.80	0.70	0.76	0.89	0.69
Silver	7440-22-4	E440.Ag	0.10	mg/kg		----	----	----	----	8.51
Silver	7440-22-4	E440	0.10	mg/kg		10.4	6.87	6.70	8.30	----
Sodium	7440-23-5	E440	50	mg/kg		19200	16200	15600	22300	17100
Strontium	7440-24-6	E440	0.50	mg/kg		476	369	342	406	300

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-6	BA2312-A-7	BA2312-A-8	BA2312-A-9	BA2312-A-10
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-006	VA23A6577-007	VA23A6577-008	VA23A6577-009	VA23A6577-010
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg		14300	12800	12500	16700	13900
Thallium	7440-28-0	E440	0.050	mg/kg		0.053	<0.050	<0.050	0.052	0.055
Tin	7440-31-5	E440	2.0	mg/kg		220	284	208	613	1010
Titanium	7440-32-6	E440	1.0	mg/kg		938	549	689	502	381
Tungsten	7440-33-7	E440	0.50	mg/kg		22.4	15.1	21.9	26.4	16.0
Uranium	7440-61-1	E440	0.050	mg/kg		3.10	2.66	2.71	3.50	3.12
Vanadium	7440-62-2	E440	0.20	mg/kg		45.6	40.4	43.7	160	40.5
Zinc	7440-66-6	E440	2.0	mg/kg		6290	4330	4520	5790	5650
Zirconium	7440-67-7	E440	1.0	mg/kg		3.7	1.9	1.4	1.8	1.8
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.1	12.2	12.1	12.2	12.1
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.38	5.33	5.71	8.08	5.52
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		8.27	8.15	8.16	8.11	7.82
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	1.08	1.08	1.02	<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		1.62	2.47	2.47	2.69	2.57
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	0.077
Calcium, TCLP	7440-70-2	E444	10	mg/L		2280	3430	3500	3490	3460
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		0.051	0.125	0.146	0.330	0.389
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.519	0.817	0.764	0.708	0.589
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		98.3	150	166	166	178
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	<0.25	0.26
Selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2312-A-6	BA2312-A-7	BA2312-A-8	BA2312-A-9	BA2312-A-10
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00	22-Mar-2023 09:00
						VA23A6577-006	VA23A6577-007	VA23A6577-008	VA23A6577-009	VA23A6577-010
						Result	Result	Result	Result	Result
TCLP Metals										
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	<0.50	0.65
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2312-A-11	BA2312-A-12	----	----	----
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6577-011	VA23A6577-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%		23.4	24.6	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		11.9	12.0	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		41500	26900	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		342	255	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		34.5	35.3	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		624	532	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.42	0.36	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		16.1	19.1	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		188	183	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		16.1	21.1	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		191000	198000	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		224	168	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		142	166	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		3750	41800	----	----	----
Iron	7439-89-6	E440	50	mg/kg		71600	56400	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		1260	2460	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		37.1	25.5	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		12200	12600	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		974	725	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.153	0.174	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		21.9	27.3	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		224	212	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		12800	12800	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		7910	6960	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		0.62	0.97	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		7.58	13.9	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		19100	17000	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		337	400	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		13800	14800	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2312-A-11	BA2312-A-12	----	----	----
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6577-011	VA23A6577-012	--------	--------	--------
						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		223	247	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		414	271	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		17.8	18.5	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		2.94	3.19	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		40.8	38.9	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		5140	29500	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		2.7	1.8	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.2	12.2	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		5.57	6.36	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		8.13	8.09	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L		1.05	1.09	----	----	----
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		2.46	2.55	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		3470	3500	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.236	0.182	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.705	0.641	----	----	----
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		141	168	----	----	----
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2312-A-11	BA2312-A-12	----	----	----
					Client sampling date / time	22-Mar-2023 09:00	22-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A6577-011	VA23A6577-012	--------	--------	--------
						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	: **VA23A6577**	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	: 28-Mar-2023 12:30
PO	: VANCO0000051998	Issue Date	: 04-Apr-2023 15:08
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA23A6577-001	BA2312-A-1	Cobalt	7440-48-4	E440	51.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6577-001	BA2312-A-1	Copper	7440-50-8	E440	115 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6577-001	BA2312-A-1	Lead	7439-92-1	E440	44.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6577-001	BA2312-A-1	Nickel	7440-02-0	E440	32.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6577-001	BA2312-A-1	Silver	7440-22-4	E440	75.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / 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 BA2312-A-10	E440.Ag	22-Mar-2023	03-Apr-2023	180 days	12 days	✓	04-Apr-2023	168 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-1	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-10	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-11	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-12	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-2	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-3	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 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
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-4	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-5	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-6	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-7	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-8	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2312-A-9	E510	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	28 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-1	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-10	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-11	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 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
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-12	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-2	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-3	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-4	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-5	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-6	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-7	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-8	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2312-A-9	E440	22-Mar-2023	31-Mar-2023	----	----		01-Apr-2023	180 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 : Moisture Content by Gravimetry										
LDPE bag BA2312-A-1	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-10	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-11	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-12	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-2	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-3	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-4	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-5	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-6	E144	22-Mar-2023	----	----	----		30-Mar-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 BA2312-A-7	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-8	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2312-A-9	E144	22-Mar-2023	----	----	----		30-Mar-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-1	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-10	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-11	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-12	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-2	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-3	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 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
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-4	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-5	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-6	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-7	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-8	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2312-A-9	E108	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	30 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-1	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-10	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-11	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 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) BA2312-A-12	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-2	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-3	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-4	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-5	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-6	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-7	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-8	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2312-A-9	E512	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	8 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) BA2312-A-1	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-10	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-11	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-12	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-2	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-3	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-4	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-5	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-6	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-7	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-8	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2312-A-9	E444	28-Mar-2023	30-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-1	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-10	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-11	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-12	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-2	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-3	EPP444	22-Mar-2023	28-Mar-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: 180 Day HT (e.g. metals ex. Hg) BA2312-A-4	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-5	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-6	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-7	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-8	EPP444	22-Mar-2023	28-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2312-A-9	EPP444	22-Mar-2023	28-Mar-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	882218	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	882217	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	882223	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	882219	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	885401	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	882218	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	882217	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	882223	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	882219	1	12	8.3	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	885401	1	1	100.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	882061	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	882218	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	882062	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	882217	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	882223	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	882061	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	882062	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	: **VA23A6577**	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	: 28-Mar-2023 12:30
PO	: VANCO0000051998	Date Analysis Commenced	: 28-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 15:08
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*
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 882219)											
VA23A6577-001	BA2312-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.0	11.9	0.9%	5%	----
Physical Tests (QC Lot: 882223)											
VA23A6577-001	BA2312-A-1	Moisture	----	E144	0.25	%	24.1	23.8	1.06%	20%	----
Metals (QC Lot: 882217)											
VA23A6577-001	BA2312-A-1	Aluminum	7429-90-5	E440	50	mg/kg	35400	44800	23.2%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	246	254	3.44%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	31.6	31.1	1.75%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	574	652	12.6%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.44	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	14.4	16.8	15.6%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	225	200	11.9%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	16.3	18.0	9.95%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	190000	216000	12.7%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	177	230	26.0%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	77.6	45.8	51.5%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1910	7100	115%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	48400	49500	2.16%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	824	525	44.2%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	28.5	32.7	13.8%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12300	13200	7.00%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	805	955	17.0%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	31.7	30.1	5.13%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	314	227	32.4%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	11100	13200	17.2%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	6580	8440	24.8%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.82	0.94	0.12	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	8.13	18.0	75.8%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	17000	21100	21.8%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	339	373	9.44%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	13400	15100	11.9%	30%	----

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: 882217) - continued											
VA23A6577-001	BA2312-A-1	Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.052	0.002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	201	267	28.2%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	259	383	38.5%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	13.7	18.3	29.1%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.97	3.34	11.6%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	38.0	45.8	18.5%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	12100	9640	22.6%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.6	3.2	0.6	Diff <2x LOR	----
Metals (QC Lot: 882218)											
VA23A6577-001	BA2312-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.130	0.180	0.0501	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: 882223)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 882217)						
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: 882217) - 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: 882218)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 885401)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 882061)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 882062)						
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: 882219)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 882223)									
Moisture	----	E144	0.25	%	50 %	99.2	90.0	110	----
Metals (QCLot: 882217)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.7	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	95.8	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.3	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.6	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	91.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	95.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.3	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	97.7	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.5	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	97.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.2	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	91.0	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.1	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 882217) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.5	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.8	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.4	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	94.0	80.0	120	----
Metals (QCLot: 882218)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
Metals (QCLot: 885401)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	89.2	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: 882061)										
VA23A6577-001	BA2312-A-1	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	93.6	50.0	140	----
TCLP Metals (QCLot: 882062)										
VA23A6577-001	BA2312-A-1	Antimony, TCLP	7440-36-0	E444	5.15 mg/L	5 mg/L	103	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.4 mg/L	12.5 mg/L	98.9	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.3	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.85 mg/L	10 mg/L	98.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.237 mg/L	0.25 mg/L	94.8	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	1.20 mg/L	1.25 mg/L	95.9	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.233 mg/L	0.25 mg/L	93.1	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.26 mg/L	2.5 mg/L	90.5	50.0	140	----
		Iron, TCLP	7439-89-6	E444	228 mg/L	250 mg/L	91.2	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.39 mg/L	10 mg/L	93.9	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	260 mg/L	250 mg/L	104	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.33 mg/L	2.5 mg/L	93.2	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.10 mg/L	5 mg/L	102	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.107 mg/L	0.1 mg/L	107	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	93.2	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.76 mg/L	5 mg/L	95.1	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.1	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.25 mg/L	10 mg/L	92.5	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	88.3	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: 882217)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	115	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	111	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	111	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	128	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	110	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	105	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	106	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	107	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	115	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	121	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	107	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	119	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	105	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	108	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	103	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	104	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	127	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	129	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	111	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: 882217) - continued									
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	101	70.0	130	----
Metals (QCLot: 882218)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division Vancouver

Work Order Reference

VA23A6577

Telephone : +1 604 253 4188

Report To				Report Format / Distribution		Service Requested (Rush for rou
Company:	Covanta Energy			☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - B
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surch
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surcl
	Burnaby BC			Email 2:	rjohnson4@covanta.com	○ Same Day or Weekend Emergency - Cont
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com	Analys
		☐ 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)				**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
	BA2312-A-1	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-2	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-3	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-4	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-5	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-6	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-7	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-8	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-9	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-10	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-11	22-Mar-23	9:00	Soil	X	X		X	1
	BA2312-A-12	22-Mar-23	9:00	Soil	X	X		X	1

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
	28-Mar-23	0800	RD	March 28, 23	12:30	19° °C				