Bottom Ash Data

2023 Week 10

The following analytical report represents bottom ash composite results for week 10 of 2023 (March 5, 2023 to March 11, 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	: **VA23A5392**	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	: 14-Mar-2023 12:20
PO	: VANCO0000051998	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Mar-2023 16:09
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2310-A-1	BA2310-A-2	BA2310-A-3	BA2310-A-4	BA2310-A-5
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
						VA23A5392-001	VA23A5392-002	VA23A5392-003	VA23A5392-004	VA23A5392-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		23.7	23.8	24.1	23.7	23.1
pH (1:2 soil:water)	----	E108	0.10	pH units		11.0	10.9	10.9	11.0	10.9
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		33900	35800	35400	51200	38000
Antimony	7440-36-0	E440	0.10	mg/kg		152	133	144	135	137
Arsenic	7440-38-2	E440	0.10	mg/kg		19.6	171	20.5	21.8	18.2
Barium	7440-39-3	E440	0.50	mg/kg		550	722	612	650	648
Beryllium	7440-41-7	E440	0.10	mg/kg		0.44	<0.75 DLM	0.37	0.39	0.38
Bismuth	7440-69-9	E440	0.20	mg/kg		11.0	15.0	11.7	11.2	10.5
Boron	7440-42-8	E440	5.0	mg/kg		208	523	235	192	213
Cadmium	7440-43-9	E440	0.020	mg/kg		9.92	22.5	11.6	10.6	10.8
Calcium	7440-70-2	E440	50	mg/kg		156000	161000	170000	158000	155000
Chromium	7440-47-3	E440	0.50	mg/kg		167	192	152	188	189
Cobalt	7440-48-4	E440	0.10	mg/kg		75.4	309	70.0	52.0	41.6
Copper	7440-50-8	E440	0.50	mg/kg		1730	6500	2910	1940	3810
Iron	7439-89-6	E440	50	mg/kg		55600	103000	55800	61900	50200
Lead	7439-92-1	E440	0.50	mg/kg		309	349	474	337	417
Lithium	7439-93-2	E440	2.0	mg/kg		29.9	44.8	24.3	32.2	25.5
Magnesium	7439-95-4	E440	20	mg/kg		12400	11000	12000	11600	12000
Manganese	7439-96-5	E440	1.0	mg/kg		767	928	732	842	656
Mercury	7439-97-6	E510	0.0500	mg/kg		0.237	0.173	0.324	0.258	0.282
Molybdenum	7439-98-7	E440	0.10	mg/kg		19.2	30.6	21.8	24.2	19.2
Nickel	7440-02-0	E440	0.50	mg/kg		107	685	133	139	119
Phosphorus	7723-14-0	E440	50	mg/kg		15800	10700	14800	14400	13000
Potassium	7440-09-7	E440	100	mg/kg		5330	4490	5640	5450	5800
Selenium	7782-49-2	E440	0.20	mg/kg		0.41	<1.49 DLM	0.49	0.42	0.44
Silver	7440-22-4	E440	0.10	mg/kg		7.72	7.47	4.99	4.85	4.88
Sodium	7440-23-5	E440	50	mg/kg		16200	15400	16700	16400	16600
Strontium	7440-24-6	E440	0.50	mg/kg		294	309	311	302	298

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2310-A-1	BA2310-A-2	BA2310-A-3	BA2310-A-4	BA2310-A-5
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
						VA23A5392-001	VA23A5392-002	VA23A5392-003	VA23A5392-004	VA23A5392-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg		11400	11300	12100	11100	10800
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.374 DLM	0.051	0.060	<0.050
Tin	7440-31-5	E440	2.0	mg/kg		123	133	118	149	1100
Titanium	7440-32-6	E440	1.0	mg/kg		263	278	268	393	333
Tungsten	7440-33-7	E440	0.50	mg/kg		27.0	19.5	27.0	24.1	27.7
Uranium	7440-61-1	E440	0.050	mg/kg		3.94	3.89	3.85	3.74	3.77
Vanadium	7440-62-2	E440	0.20	mg/kg		43.7	50.2	48.4	47.9	45.0
Zinc	7440-66-6	E440	2.0	mg/kg		3700	4510	4230	6790	3650
Zirconium	7440-67-7	E440	1.0	mg/kg		2.0	<7.5 DLM	2.2	2.7	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.7	11.7	11.8	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.32	7.57	7.33	8.47	6.66
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444	0.010	pH units		6.69	6.64	6.63	6.72	6.53
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		1.77	1.83	1.85	1.82	1.82
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.082	0.105	0.090	0.089	0.098
Calcium, TCLP	7440-70-2	E444	10	mg/L		1950	1980	1980	2030	2010
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		0.869	1.23	0.966	1.49	0.918
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.482	0.625	0.591	0.555	0.634
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		122	122	130	125	124
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		0.49	0.53	0.47	0.41	0.45
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)					Client sample ID	BA2310-A-1	BA2310-A-2	BA2310-A-3	BA2310-A-4	BA2310-A-5
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit		VA23A5392-001	VA23A5392-002	VA23A5392-003	VA23A5392-004	VA23A5392-005
						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		17.5	18.5	11.5	7.00	13.8
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	BA2310-A-6	BA2310-A-7	BA2310-A-8	BA2310-A-9	BA2310-A-10
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
						VA23A5392-006	VA23A5392-007	VA23A5392-008	VA23A5392-009	VA23A5392-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		23.8	24.7	25.7	24.0	24.6
pH (1:2 soil:water)	----	E108	0.10	pH units		11.0	11.2	11.3	11.1	11.3
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		55300	38000	41000	43900	40200
Antimony	7440-36-0	E440	0.10	mg/kg		131	120	119	129	160
Arsenic	7440-38-2	E440	0.10	mg/kg		15.7	16.6	16.2	21.2	19.5
Barium	7440-39-3	E440	0.50	mg/kg		584	538	604	593	532
Beryllium	7440-41-7	E440	0.10	mg/kg		0.34	0.42	0.35	0.42	0.38
Bismuth	7440-69-9	E440	0.20	mg/kg		8.07	10.6	7.91	12.8	14.7
Boron	7440-42-8	E440	5.0	mg/kg		157	212	212	237	172
Cadmium	7440-43-9	E440	0.020	mg/kg		9.50	8.05	6.71	9.56	10.9
Calcium	7440-70-2	E440	50	mg/kg		139000	142000	135000	155000	158000
Chromium	7440-47-3	E440	0.50	mg/kg		143	161	230	180	167
Cobalt	7440-48-4	E440	0.10	mg/kg		33.6	59.6	32.9	28.3	360
Copper	7440-50-8	E440	0.50	mg/kg		2820	2920	4420	1300	1460
Iron	7439-89-6	E440	50	mg/kg		61100	75400	78700	57300	46000
Lead	7439-92-1	E440	0.50	mg/kg		388	395	260	7960	724
Lithium	7439-93-2	E440	2.0	mg/kg		24.8	28.4	21.2	25.6	76.0
Magnesium	7439-95-4	E440	20	mg/kg		11100	11100	11200	11700	11800
Manganese	7439-96-5	E440	1.0	mg/kg		776	912	1650	1140	2140
Mercury	7439-97-6	E510	0.0500	mg/kg		0.202	0.151	0.156	0.214	0.130
Molybdenum	7439-98-7	E440	0.10	mg/kg		19.4	20.9	60.5	32.7	84.9
Nickel	7440-02-0	E440	0.50	mg/kg		132	171	131	122	286
Phosphorus	7723-14-0	E440	50	mg/kg		13200	11800	11900	13300	13500
Potassium	7440-09-7	E440	100	mg/kg		5420	5400	5100	5680	5710
Selenium	7782-49-2	E440	0.20	mg/kg		0.34	0.34	0.42	0.43	0.39
Silver	7440-22-4	E440	0.10	mg/kg		4.43	5.28	8.94	6.59	7.15
Sodium	7440-23-5	E440	50	mg/kg		15900	17000	16900	17600	17400
Strontium	7440-24-6	E440	0.50	mg/kg		279	306	348	343	304
Sulfur	7704-34-9	E440	1000	mg/kg		9500	10000	8900	10400	12800

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2310-A-6	BA2310-A-7	BA2310-A-8	BA2310-A-9	BA2310-A-10
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
						VA23A5392-006	VA23A5392-007	VA23A5392-008	VA23A5392-009	VA23A5392-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		0.184	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440	2.0	mg/kg		94.4	116	108	133	131
Titanium	7440-32-6	E440	1.0	mg/kg		641	410	457	427	370
Tungsten	7440-33-7	E440	0.50	mg/kg		27.9	25.9	27.6	35.6	27.8
Uranium	7440-61-1	E440	0.050	mg/kg		3.21	2.94	2.71	3.76	3.31
Vanadium	7440-62-2	E440	0.20	mg/kg		42.6	40.9	43.7	44.8	51.8
Zinc	7440-66-6	E440	2.0	mg/kg		25300	3240	2890	4330	4120
Zirconium	7440-67-7	E440	1.0	mg/kg		2.5	1.9	1.8	2.0	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.8	11.8	11.8	11.9
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		7.96	8.82	8.57	8.67	8.65
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444	0.010	pH units		6.63	6.79	6.68	6.53	6.72
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		1.77	1.88	2.50	1.86	1.85
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.107	0.098	0.067	0.089	0.079
Calcium, TCLP	7440-70-2	E444	10	mg/L		1990	1990	2000	1970	2010
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		1.68	0.908	0.947	1.58	0.922
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.491	0.468	0.579	0.477	0.428
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		122	126	127	126	122
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		0.44	0.47	0.43	0.69	0.35
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2310-A-6	BA2310-A-7	BA2310-A-8	BA2310-A-9	BA2310-A-10
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00	08-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit		VA23A5392-006	VA23A5392-007	VA23A5392-008	VA23A5392-009	VA23A5392-010
						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	0.19	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L		9.18	4.59	7.65	13.3	11.0
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	BA2310-A-11	BA2310-A-12	----	----	----
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5392-011	VA23A5392-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%		25.8	24.4	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		11.1	11.1	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		53700	62300	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg		119	116	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg		15.0	16.6	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg		601	572	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg		0.48	0.56	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg		9.63	12.2	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg		195	201	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg		8.19	9.40	----	----	----
Calcium	7440-70-2	E440	50	mg/kg		135000	151000	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg		225	431	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg		60.4	70.0	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		2090	1140	----	----	----
Iron	7439-89-6	E440	50	mg/kg		90000	64400	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg		1810	315	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg		21.1	31.4	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg		11000	13200	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg		1000	810	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg		0.168	0.175	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg		43.4	66.6	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg		223	249	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg		11500	13900	----	----	----
Potassium	7440-09-7	E440	100	mg/kg		5080	5660	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg		0.34	0.37	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		4.29	9.70	----	----	----
Sodium	7440-23-5	E440	50	mg/kg		15800	17200	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg		834	292	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg		9900	11200	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2310-A-11	BA2310-A-12	----	----	----
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5392-011	VA23A5392-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		0.051	<0.050	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		142	120	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		516	512	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		17.5	25.1	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		3.06	3.30	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		46.1	265	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		7380	5820	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		2.5	3.7	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.8	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.20	7.76	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.89	2.89	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.75	6.57	----	----	----
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		1.82	1.75	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.096	0.087	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		2000	1920	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.06	0.960	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.505	0.520	----	----	----
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		123	120	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.39	0.48	----	----	----
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	BA2310-A-11	BA2310-A-12	----	----	----
					Client sampling date / time	08-Mar-2023 09:00	08-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5392-011	VA23A5392-012	--------	--------	--------	
					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	4.28	16.8	----	----	----	
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	: **VA23A5392**	Page	: 1 of 15
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	: 14-Mar-2023 12:20
PO	: VANCO0000051998	Issue Date	: 20-Mar-2023 16:09
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- 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.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-1	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-10	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-11	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-12	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-2	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-3	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-4	E510	08-Mar-2023	16-Mar-2023	----	----		17-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 BA2310-A-5	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-6	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-7	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-8	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2310-A-9	E510	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-1	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-10	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-11	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-12	E440	08-Mar-2023	16-Mar-2023	----	----		17-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
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-2	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-3	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-4	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-5	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-6	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-7	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-8	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2310-A-9	E440	08-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	9 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-1	E144	08-Mar-2023	----	----	----		15-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 BA2310-A-10	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-11	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-12	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-2	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-3	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-4	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-5	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-6	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-7	E144	08-Mar-2023	----	----	----		15-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 BA2310-A-8	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2310-A-9	E144	08-Mar-2023	----	----	----		15-Mar-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-1	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-10	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-11	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-12	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-2	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-3	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-4	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 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
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-5	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-6	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-7	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-8	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2310-A-9	E108	08-Mar-2023	16-Mar-2023	----	----		16-Mar-2023	30 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-1	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-10	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-11	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-12	E512	15-Mar-2023	17-Mar-2023	----	----		17-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
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-2	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-3	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-4	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-5	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-6	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-7	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-8	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2310-A-9	E512	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	28 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-1	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-10	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-11	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-12	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-2	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-3	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-4	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-5	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-6	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-7	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-8	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2310-A-9	E444	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	180 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-1	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-10	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-11	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-12	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-2	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-3	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-4	EPP444	08-Mar-2023	15-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) BA2310-A-5	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-6	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-7	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-8	EPP444	08-Mar-2023	15-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2310-A-9	EPP444	08-Mar-2023	15-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	864085	1	17	5.8	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	864086	1	17	5.8	5.0	✓
Moisture Content by Gravimetry	E144	864092	1	17	5.8	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	864087	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	864085	2	17	11.7	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	864086	2	17	11.7	10.0	✓
Moisture Content by Gravimetry	E144	864092	1	17	5.8	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	864087	1	17	5.8	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	867497	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	864085	1	17	5.8	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	867498	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	864086	1	17	5.8	5.0	✓
Moisture Content by Gravimetry	E144	864092	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	867497	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	867498	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.
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
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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	: **VA23A5392**	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, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 14-Mar-2023 12:20
PO	: VANCO0000051998	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Mar-2023 16:09
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 864087)											
VA23A5350-007	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	5.77	6.00	3.9%	5%	----
Physical Tests (QC Lot: 864092)											
VA23A5350-007	Anonymous	Moisture	----	E144	0.25	%	19.6	18.7	4.84%	20%	----
Metals (QC Lot: 864085)											
VA23A5350-007	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0844	0.0768	0.0076	Diff <2x LOR	----
Metals (QC Lot: 864086)											
VA23A5350-007	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	27500	26600	3.20%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.41	0.40	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	4.87	4.57	6.36%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	204	189	7.94%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.55	0.56	0.008	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.096	0.089	0.007	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	4740	4640	2.10%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	45.3	46.4	2.28%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	14.8	13.8	7.09%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	24.7	24.4	1.08%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	31000	30500	1.68%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	5.87	5.40	8.28%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.4	15.4	0.0368%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	6850	6870	0.307%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	516	456	12.5%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.37	0.43	0.06	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	34.7	34.0	1.93%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	536	513	4.28%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1250	1180	5.52%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	168	168	0.04	Diff <2x LOR	----

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: 864086) - continued											
VA23A5350-007	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	99.7	87.3	13.3%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.130	0.120	0.010	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	595	474	22.7%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.516	0.469	9.53%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	70.7	69.3	2.00%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	70.0	67.5	3.60%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.6	2.3	0.3	Diff <2x LOR	----

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: 864092)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 864085)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 864086)						
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: 864086) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 867497)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 867498)						
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: 864087)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 864092)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 864085)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	80.0	120	----
Metals (QCLot: 864086)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.9	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	96.0	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.2	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.0	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.3	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.0	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.1	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	92.0	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.8	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	94.5	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	106	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	100	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.9	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.8	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.7	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.7	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: 864086) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.0	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.1	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.1	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	98.4	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	89.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 867497)										
VA23A5392-001	BA2310-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	102	50.0	140	----
TCLP Metals (QCLot: 867498)										
VA23A5392-001	BA2310-A-1	Antimony, TCLP	7440-36-0	E444	4.65 mg/L	5 mg/L	93.1	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.2	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.0 mg/L	12.5 mg/L	88.3	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.220 mg/L	0.25 mg/L	88.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.16 mg/L	10 mg/L	91.6	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.221 mg/L	0.25 mg/L	88.6	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.08 mg/L	1.25 mg/L	86.1	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.15 mg/L	2.5 mg/L	86.0	50.0	140	----
		Iron, TCLP	7439-89-6	E444	217 mg/L	250 mg/L	86.8	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.96 mg/L	10 mg/L	89.6	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.3	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.20 mg/L	2.5 mg/L	88.0	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.43 mg/L	5 mg/L	88.5	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.097 mg/L	0.1 mg/L	96.9	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.9	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.38 mg/L	5 mg/L	87.6	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.6	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	83.9	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: 864085)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 864086)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	110	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	102	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.2	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	106	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	94.3	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	101	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	98.0	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	99.3	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	105	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	99.6	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	98.2	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.9	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	95.9	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	97.4	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	99.5	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	93.9	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	90.8	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	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: 864086) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	100	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	106	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	91.9	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC

Environmental Division
Vancouver
Work Order Reference
VA23A5392

Telephone : +1 604 253 4188

Report To				**Report Format / Distribution**				**Service Requested** (Rush for routine a
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge -
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge -
	Burnaby BC			Email 2:	rjohnson4@covanta.com			○ Same Day or Weekend Emergency - Contact ALS
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			**Analysis Rec**
		☐ 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)	5392			**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
	BA2310-A-1	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-2	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-3	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-4	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-5	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-6	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-7	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-8	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-9	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-10	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-11	08-Mar-23	9:00	Soil	X	X				X						1
	BA2310-A-12	08-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
	14-Mar-23	0820	CW	Mar 14	1220	19 °C				