Bottom Ash Data

2023 Week 24

The following analytical report represents bottom ash composite results for week 24 of 2023 (June 11, 2023 to June 17, 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	: **VA23B4014**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 20-Jun-2023 13:00
PO	: PO# 46693 Weekly Bottom Ash - Suite	Date Analysis Commenced	: 23-Jun-2023
C-O-C number	: ----	Issue Date	: 28-Jun-2023 10:08
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*
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kinny Wu	Lab 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.

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2324-A-1	BA2324-A-2	BA2324-A-3	BA2324-A-4	BA2324-A-5
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
						VA23B4014-001	VA23B4014-002	VA23B4014-003	VA23B4014-004	VA23B4014-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		22.9	22.9	20.4	22.6	22.6
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		10.7	10.7	10.8	10.8	11.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		51600	42300	41200	29100	30400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		105	116	104	110	111
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.5	23.3	20.8	24.4	26.3
Barium	7440-39-3	E440/VA	0.50	mg/kg		599	682	639	562	563
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.40	0.43	0.40	0.36	0.33
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		84.9	10.4	8.97	8.88	11.3
Boron	7440-42-8	E440/VA	5.0	mg/kg		316	248	206	285	169
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		17.5	9.74	11.0	15.7	9.89
Calcium	7440-70-2	E440/VA	50	mg/kg		140000	148000	146000	142000	139000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		178	151	178	194	238
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		70.0	263	70.4	209	52.0
Copper	7440-50-8	E440/VA	0.50	mg/kg		2370	3700	16200	6540	22700
Iron	7439-89-6	E440/VA	50	mg/kg		52300	43400	57200	59800	57600
Lead	7439-92-1	E440/VA	0.50	mg/kg		4100	496	536	502	436
Lithium	7439-93-2	E440/VA	2.0	mg/kg		27.7	35.9	24.7	36.8	22.8
Magnesium	7439-95-4	E440/VA	20	mg/kg		10600	11600	11500	11400	11200
Manganese	7439-96-5	E440/VA	1.0	mg/kg		849	670	896	828	842
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0782	0.0740	0.155	0.0522	0.0814
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		19.2	19.3	23.1	21.0	22.4
Nickel	7440-02-0	E440/VA	0.50	mg/kg		150	132	254	528	299
Phosphorus	7723-14-0	E440/VA	50	mg/kg		10000	9790	9960	9170	8840
Potassium	7440-09-7	E440/VA	100	mg/kg		5550	5160	5340	4530	4490
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.34	0.31	0.32	0.35	0.34
Silver	7440-22-4	E440/VA	0.10	mg/kg		21.1	14.8	19.0	5.41	5.14
Sodium	7440-23-5	E440/VA	50	mg/kg		16400	15600	16200	15000	14600
Strontium	7440-24-6	E440/VA	0.50	mg/kg		282	308	304	310	281

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2324-A-1	BA2324-A-2	BA2324-A-3	BA2324-A-4	BA2324-A-5
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
						VA23B4014-001	VA23B4014-002	VA23B4014-003	VA23B4014-004	VA23B4014-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		9600	10200	9600	9800	9900
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.074	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		107	472	201	156	577
Titanium	7440-32-6	E440/VA	1.0	mg/kg		565	334	293	239	283
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		22.4	22.2	107	29.2	22.8
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.88	4.47	4.23	4.06	4.30
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		52.8	54.9	51.6	48.0	52.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3010	3480	3520	4630	13100
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.0	1.7	2.3	1.9	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.6	11.4	11.6	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		5.88	5.02	6.00	6.19	6.23
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.13	5.91	6.02	5.87	6.12
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.11	2.36	2.55	2.32	2.42
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.166	0.147	0.146	0.154	0.152
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2070	2140	2100	2110	2220
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		0.814	2.27	0.880	0.856	1.07
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.05	0.909	0.738	0.544	0.856
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	0.27	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		126	128	129	128	137
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.52	0.59	0.81	0.93	0.66
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2324-A-1	BA2324-A-2	BA2324-A-3	BA2324-A-4	BA2324-A-5
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B4014-001	VA23B4014-002	VA23B4014-003	VA23B4014-004	VA23B4014-005
						Result	Result	Result	Result	Result
TCLP Metals										
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		36.9	27.7	26.8	37.2	30.8
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2324-A-6	BA2324-A-7	BA2324-A-8	BA2324-A-9	BA2324-A-10
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
						VA23B4014-006	VA23B4014-007	VA23B4014-008	VA23B4014-009	VA23B4014-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.5	24.3	23.5	23.8	23.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		10.8	10.8	10.9	10.9	10.9
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		33300	34200	31000	36600	36600
Antimony	7440-36-0	E440/VA	0.10	mg/kg		121	105	112	209	106
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		20.6	21.0	27.8	21.4	19.0
Barium	7440-39-3	E440/VA	0.50	mg/kg		514	610	642	642	732
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.35	0.34	0.41	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		43.8	10.2	8.11	9.04	8.96
Boron	7440-42-8	E440/VA	5.0	mg/kg		166	246	160	175	146
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		15.4	33.6	9.59	10.0	8.07
Calcium	7440-70-2	E440/VA	50	mg/kg		148000	144000	132000	141000	133000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		178	275	252	159	162
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		90.1	38.5	242	95.9	163
Copper	7440-50-8	E440/VA	0.50	mg/kg		1470	3370	2340	2740	23400
Iron	7439-89-6	E440/VA	50	mg/kg		56700	58700	76100	44500	45400
Lead	7439-92-1	E440/VA	0.50	mg/kg		468	487	374	1270	433
Lithium	7439-93-2	E440/VA	2.0	mg/kg		26.2	24.2	25.8	28.2	28.6
Magnesium	7439-95-4	E440/VA	20	mg/kg		10500	11300	11400	11700	11200
Manganese	7439-96-5	E440/VA	1.0	mg/kg		828	1280	823	766	1220
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.108	0.133	0.0806	0.0628	0.0823
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		16.5	34.7	20.5	20.9	16.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		188	302	192	201	201
Phosphorus	7723-14-0	E440/VA	50	mg/kg		10500	9550	8360	9750	9650
Potassium	7440-09-7	E440/VA	100	mg/kg		4500	4400	4280	4710	4400
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.30	1.47	0.27	0.34	0.34
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.24	4.49	3.72	3.66	11.0
Sodium	7440-23-5	E440/VA	50	mg/kg		14300	14300	13900	14400	14500
Strontium	7440-24-6	E440/VA	0.50	mg/kg		295	288	311	284	286
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10700	9700	8500	9500	9000

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2324-A-6	BA2324-A-7	BA2324-A-8	BA2324-A-9	BA2324-A-10
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
						VA23B4014-006	VA23B4014-007	VA23B4014-008	VA23B4014-009	VA23B4014-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		91.0	97.5	113	516	246
Titanium	7440-32-6	E440/VA	1.0	mg/kg		171	186	210	256	299
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		26.0	21.9	21.0	24.9	19.2
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.34	4.24	3.75	4.25	3.85
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		50.4	47.2	45.8	51.8	48.8
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3460	4280	3110	5800	3080
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.1	3.1	1.9	1.9	1.4
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.5	11.6	11.5	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		5.37	6.22	5.79	5.84	6.16
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.22	6.11	6.13	6.31	6.03
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.98	2.43	2.56	2.44	2.37
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.052	0.149	0.158	0.247	0.318
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2410	2200	2200	2160	2150
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		0.616	1.87	1.24	1.02	1.96
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.766	1.26	1.02	0.826	1.04
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	0.32	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		144	134	137	128	133
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.39	0.68	0.56	0.62	0.68
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2324-A-6	BA2324-A-7	BA2324-A-8	BA2324-A-9	BA2324-A-10
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00	14-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B4014-006	VA23B4014-007	VA23B4014-008	VA23B4014-009	VA23B4014-010
						Result	Result	Result	Result	Result
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		2.09	38.5	32.2	30.4	34.7
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2324-A-11	BA2324-A-12	----	----	----
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	----	----	----
						VA23B4014-011	VA23B4014-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		22.4	21.4	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.0	10.9	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		31500	32400	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		100	108	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		19.2	20.2	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		648	586	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.33	0.33	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		11.6	16.8	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		172	154	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.0	9.38	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		133000	133000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		188	235	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		27.4	68.5	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		1290	6460	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		64300	68100	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		406	542	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		21.8	34.7	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		11200	10300	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		712	740	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.102	0.182	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		20.1	16.5	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		179	276	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9320	9060	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		4490	4430	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.24	0.35	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.83	6.97	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		14000	14100	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		266	270	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		9300	9400	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2324-A-11	BA2324-A-12	----	----	----
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B4014-011	VA23B4014-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		91.5	93.9	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		362	322	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		22.3	27.2	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.02	3.96	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		45.8	44.6	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3660	6470	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.4	1.5	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.6	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.37	7.05	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.17	6.24	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.51	2.69	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.137	0.160	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2240	2180	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.21	2.16	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.09	1.09	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		137	137	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.61	0.59	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2324-A-11	BA2324-A-12	----	----	----
					Client sampling date / time	14-Jun-2023 09:00	14-Jun-2023 09:00	----	----	----
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*		VA23B4014-011	VA23B4014-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		37.3	52.7	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	----	----	----

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

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B4014**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 20-Jun-2023 13:00
PO	: PO# 46693 Weekly Bottom Ash - Suite	Issue Date	: 28-Jun-2023 10:08
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	VA23B4014-001	BA2324-A-1	Aluminum	7429-90-5	E440	52.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Bismuth	7440-69-9	E440	159 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Boron	7440-42-8	E440	56.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Cadmium	7440-43-9	E440	187 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Cobalt	7440-48-4	E440	82.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Lead	7439-92-1	E440	155 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Lithium	7439-93-2	E440	68.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Strontium	7440-24-6	E440	55.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Tin	7440-31-5	E440	49.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B4014-001	BA2324-A-1	Titanium	7440-32-6	E440	94.8 % 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 : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-1	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-10	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-11	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-12	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-2	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-3	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-4	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 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 BA2324-A-5	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-6	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-7	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-8	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2324-A-9	E510	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	28 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-1	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-10	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-11	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-12	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-2	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-3	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-4	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-5	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-6	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-7	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-8	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2324-A-9	E440	14-Jun-2023	24-Jun-2023	----	----		27-Jun-2023	180 days	13 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-1	E144	14-Jun-2023	----	----	----		23-Jun-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 BA2324-A-10	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-11	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-12	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-2	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-3	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-4	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-5	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-6	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-7	E144	14-Jun-2023	----	----	----		23-Jun-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 BA2324-A-8	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2324-A-9	E144	14-Jun-2023	----	----	----		23-Jun-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-1	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-10	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-11	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-12	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-2	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-3	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-4	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 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 BA2324-A-5	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-6	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-7	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-8	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2324-A-9	E108	14-Jun-2023	24-Jun-2023	----	----		26-Jun-2023	30 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-1	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-10	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-11	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-12	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-2	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-3	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-4	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-5	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-6	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-7	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-8	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2324-A-9	E512	26-Jun-2023	27-Jun-2023	----	----		27-Jun-2023	28 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-1	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-10	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-11	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-12	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-2	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-3	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-4	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-5	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-6	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-7	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-8	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2324-A-9	E444	26-Jun-2023	27-Jun-2023	----	----		28-Jun-2023	180 days	14 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-1	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-10	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-11	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-12	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-2	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-3	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-4	EPP444	14-Jun-2023	26-Jun-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) BA2324-A-5	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-6	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-7	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-8	EPP444	14-Jun-2023	26-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2324-A-9	EPP444	14-Jun-2023	26-Jun-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	1005391	1	19	5.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1005392	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1005394	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1005393	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1005391	2	19	10.5	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1005392	2	19	10.5	10.0	✓
Moisture Content by Gravimetry	E144	1005394	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1005393	1	19	5.2	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1011711	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1005391	1	19	5.2	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1011710	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1005392	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1005394	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1011711	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1011710	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	: **VA23B4014**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 20-Jun-2023 13:00
PO	: PO# 46693 Weekly Bottom Ash - Suite	Date Analysis Commenced	: 23-Jun-2023
C-O-C number	: ----	Issue Date	: 28-Jun-2023 10:08
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*
Brieanna Allen	Production/Validation Manager	Vancouver Organics, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Kinny Wu	Lab 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: 1005393)											
VA23B4014-001	BA2324-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	0.6%	5%	----
Physical Tests (QC Lot: 1005394)											
VA23B4014-001	BA2324-A-1	Moisture	----	E144	0.25	%	22.9	23.3	1.75%	20%	----
Metals (QC Lot: 1005391)											
VA23B4014-001	BA2324-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0782	0.0730	0.0052	Diff <2x LOR	----
Metals (QC Lot: 1005392)											
VA23B4014-001	BA2324-A-1	Aluminum	7429-90-5	E440	50	mg/kg	51600	30200	52.3%	40%	DUP-H
		Antimony	7440-36-0	E440	0.10	mg/kg	105	107	2.34%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	22.5	19.6	13.7%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	599	599	0.0206%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.37	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	84.9	9.78	159%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	316	177	56.2%	30%	DUP-H
		Cadmium	7440-43-9	E440	0.020	mg/kg	17.5	506	187%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	140000	143000	2.44%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	178	172	3.09%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	70.0	29.1	82.5%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2370	1820	26.4%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	52300	57000	8.75%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	4100	516	155%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	27.7	56.3	68.0%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	10600	12000	12.8%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	849	785	7.88%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	19.2	19.7	2.80%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	150	161	7.38%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	10000	9290	7.55%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5550	4540	19.8%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.32	0.03	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	21.1	14.7	35.6%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	16400	14200	14.1%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1005392) - continued											
VA23B4014-001	BA2324-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	282	495	55.0%	40%	DUP-H
		Sulfur	7704-34-9	E440	1000	mg/kg	9600	9600	0.887%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.074	<0.050	0.024	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	107	177	49.7%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	565	202	94.8%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	22.4	29.2	26.2%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.88	4.18	7.66%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	52.8	49.7	5.98%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3010	3760	22.1%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.0	0.01	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: 1005394)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1005391)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1005392)						
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: 1005392) - 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: 1011710)						
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	----
TCLP Metals (QCLot: 1011711)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----

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: 1005393)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 1005394)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1005391)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 1005392)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	114	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	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	103	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.5	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.2	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	112	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	96.8	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	112	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	110	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	111	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.8	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1005392) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	110	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.9	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.2	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	97.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	93.1	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: 1011710)										
VA23B4014-001	BA2324-A-1	Antimony, TCLP	7440-36-0	E444	4.76 mg/L	5 mg/L	95.3	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.6 mg/L	12.5 mg/L	101	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.247 mg/L	0.25 mg/L	98.8	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.235 mg/L	0.25 mg/L	94.0	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	1.26 mg/L	1.25 mg/L	101	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	2.39 mg/L	2.5 mg/L	95.7	50.0	140	----
		Iron, TCLP	7439-89-6	E444	254 mg/L	250 mg/L	101	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.46 mg/L	10 mg/L	94.6	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	275 mg/L	250 mg/L	110	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.49 mg/L	2.5 mg/L	99.5	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.05 mg/L	5 mg/L	101	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	97.6	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.79 mg/L	5 mg/L	95.8	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	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	9 mg/L	10 mg/L	88.8	50.0	150	----
TCLP Metals (QCLot: 1011711)										
VA23B4014-001	BA2324-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	102	50.0	140	----

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: 1005391)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	105	70.0	130	----
Metals (QCLot: 1005392)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	92.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	99.8	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	95.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	112	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	110	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	94.7	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	110	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	113	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	97.2	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	93.0	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	97.6	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	93.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	89.3	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	101	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: 1005392) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	98.7	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	105	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	91.9	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	90.4	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

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

Lab Work Order # (lab use only)

Environmental Division Vancouver

Work Order Reference

VA23B4014

Telephone : +1 604 253 4188

ALS Contact: | Sampler:

Sample #	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
BA2324-A-1	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-2	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-3	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-4	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-5	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-6	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-7	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-8	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-9	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-10	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-11	14-Jun-23	9:00	Soil	X	X		X	1
BA2324-A-12	14-Jun-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
[signature]	20-Jun-23	08	JC	20/6/23	1pm	20,1°C				