Bottom Ash Data

2023 Week 31

The following analytical report represents bottom ash composite results for week 31 of 2023 (July 30, 2023 to August 5, 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	: **VA23B8411**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 10-Aug-2023 12:40
PO	: VANCO0000051998	Date Analysis Commenced	: 10-Aug-2023
C-O-C number	: ----	Issue Date	: 18-Aug-2023 13:16
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2331-A-1	BA2331-A-2	BA2331-A-3	BA2331-A-4	BA2331-A-5
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
						VA23B8411-001	VA23B8411-002	VA23B8411-003	VA23B8411-004	VA23B8411-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.1	22.5	21.0	23.5	22.2
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.5	11.4	11.4	11.4	11.4
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		29400	30400	47600	39600	35500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		110	109	83.6	109	131
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.2	25.8	21.2	26.0	22.4
Barium	7440-39-3	E440/VA	0.50	mg/kg		489	454	474	423	448
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.42	0.29	0.30	0.35	0.30
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.17	17.1	8.08	12.4	11.9
Boron	7440-42-8	E440/VA	5.0	mg/kg		170	155	128	169	164
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		13.2	14.3	11.0	12.1	11.1
Calcium	7440-70-2	E440/VA	50	mg/kg		138000	142000	123000	137000	139000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		176	207	180	218	186
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		160	51.5	56.0	45.6	329
Copper	7440-50-8	E440/VA	0.50	mg/kg		3290	2030	1310	1710	9000
Iron	7439-89-6	E440/VA	50	mg/kg		51000	52500	53900	44600	52300
Lead	7439-92-1	E440/VA	0.50	mg/kg		1000	346	432	385	375
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.8	22.6	21.7	22.6	26.4
Magnesium	7439-95-4	E440/VA	20	mg/kg		10800	11600	9840	10200	10900
Manganese	7439-96-5	E440/VA	1.0	mg/kg		951	779	1140	890	734
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	0.0594	0.0693
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		23.1	23.6	21.0	22.0	24.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg		437	179	142	160	176
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9240	10500	9000	10400	10300
Potassium	7440-09-7	E440/VA	100	mg/kg		5240	5230	4680	5690	4850
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.50	1.53	0.42	0.42	0.46
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.96	8.42	3.43	3.77	>82.5
Sodium	7440-23-5	E440/VA	50	mg/kg		14200	14300	13200	15800	14600
Strontium	7440-24-6	E440/VA	0.50	mg/kg		253	267	216	254	266

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2331-A-1	BA2331-A-2	BA2331-A-3	BA2331-A-4	BA2331-A-5
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
						VA23B8411-001	VA23B8411-002	VA23B8411-003	VA23B8411-004	VA23B8411-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11200	12500	10000	12400	11300
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.053	0.058	<0.050	0.057	0.069
Tin	7440-31-5	E440/VA	2.0	mg/kg		110	153	67.6	86.5	4170
Titanium	7440-32-6	E440/VA	1.0	mg/kg		220	285	374	321	314
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		24.9	30.2	33.7	36.5	31.9
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.58	3.87	3.20	3.70	3.40
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		40.9	43.2	38.0	46.0	40.0
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3480	3750	2580	4130	3610
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.8	1.4	3.8	3.0	2.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.8	11.9	11.8	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.99	7.65	7.36	7.47	7.44
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444/VA	0.010	pH units		8.03	8.12	7.80	8.19	8.08
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		1.55	1.72	1.66	1.64	1.64
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1540	1590	1540	1550	1540
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		0.114	0.054	0.162	<0.050	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.874	0.954	0.824	1.02	0.955
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		80.0	81.4	87.0	82.1	82.7
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		<0.25	<0.25	<0.25	<0.25	<0.25
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2331-A-1	BA2331-A-2	BA2331-A-3	BA2331-A-4	BA2331-A-5
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8411-001	VA23B8411-002	VA23B8411-003	VA23B8411-004	VA23B8411-005
						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		<0.50	<0.50	<0.50	<0.50	<0.50
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2331-A-6	BA2331-A-7	BA2331-A-8	BA2331-A-9	BA2331-A-10
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
						VA23B8411-006	VA23B8411-007	VA23B8411-008	VA23B8411-009	VA23B8411-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.2	21.4	22.3	21.4	22.2
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.7	11.5	11.3	11.5	11.5
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		42000	35300	35100	30500	27700
Antimony	7440-36-0	E440/VA	0.10	mg/kg		106	114	110	94.7	108
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		24.2	23.1	22.8	22.9	26.1
Barium	7440-39-3	E440/VA	0.50	mg/kg		466	445	454	517	472
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.32	0.31	0.29	0.42	0.34
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		10.4	10.6	11.7	10.6	10.9
Boron	7440-42-8	E440/VA	5.0	mg/kg		230	175	224	222	153
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.2	10.1	17.4	10.7	12.1
Calcium	7440-70-2	E440/VA	50	mg/kg		137000	128000	134000	127000	134000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		219	461	209	179	182
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		99.5	71.8	134	122	267
Copper	7440-50-8	E440/VA	0.50	mg/kg		1690	1610	5610	14000	6540
Iron	7439-89-6	E440/VA	50	mg/kg		49000	35100	48400	65500	49900
Lead	7439-92-1	E440/VA	0.50	mg/kg		400	926	486	810	8210
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.4	38.4	26.1	25.3	37.0
Magnesium	7439-95-4	E440/VA	20	mg/kg		11600	9520	10900	10500	10700
Manganese	7439-96-5	E440/VA	1.0	mg/kg		663	636	715	905	668
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0520	0.174	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		24.1	20.7	21.7	24.0	20.4
Nickel	7440-02-0	E440/VA	0.50	mg/kg		168	230	159	191	226
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9750	10100	8880	8840	9590
Potassium	7440-09-7	E440/VA	100	mg/kg		5240	5000	5300	5320	4980
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.41	0.40	1.60	0.44	0.58
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.18	3.84	4.64	4.01	6.79
Sodium	7440-23-5	E440/VA	50	mg/kg		15300	13900	14800	13700	14000
Strontium	7440-24-6	E440/VA	0.50	mg/kg		248	249	260	235	245
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10900	10600	11800	10700	10800

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2331-A-6	BA2331-A-7	BA2331-A-8	BA2331-A-9	BA2331-A-10
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
						VA23B8411-006	VA23B8411-007	VA23B8411-008	VA23B8411-009	VA23B8411-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.054	0.050	0.058	0.082	0.103
Tin	7440-31-5	E440/VA	2.0	mg/kg		110	112	150	342	158
Titanium	7440-32-6	E440/VA	1.0	mg/kg		316	193	222	276	186
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		22.0	39.6	30.8	19.2	23.0
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.53	3.34	3.58	3.32	3.50
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		52.0	39.8	42.6	39.0	39.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg		2900	2600	4840	3150	9900
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.1	2.7	2.3	1.6	1.7
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.8	11.8	11.9	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		7.68	6.98	8.20	8.19	7.97
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.96	8.07	7.53	8.14	8.18
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		1.64	1.71	1.83	1.67	1.63
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1580	1580	1740	1590	1590
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		0.123	0.064	0.444	0.065	0.056
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.982	0.897	0.937	1.06	1.05
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		87.5	81.7	97.0	86.2	83.8
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		<0.25	<0.25	<0.25	<0.25	<0.25
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2331-A-6	BA2331-A-7	BA2331-A-8	BA2331-A-9	BA2331-A-10
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00	02-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8411-006	VA23B8411-007	VA23B8411-008	VA23B8411-009	VA23B8411-010
						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		<0.50	<0.50	<0.50	<0.50	<0.50
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2331-A-11	BA2331-A-12	----	----	----
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	----	----	----
						VA23B8411-011	VA23B8411-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.9	22.0	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.6	11.4	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		32300	30600	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		96.3	102	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.0	22.5	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		478	424	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.36	0.34	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.60	9.70	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		176	161	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		20.1	11.5	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		135000	139000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		196	212	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		47.3	56.8	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		4170	3480	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		65100	60200	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		424	324	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.0	24.0	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		10100	10300	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		798	3120	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0569	0.0644	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		20.5	19.9	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		205	150	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9240	9470	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		5050	5240	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.51	0.50	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.68	4.03	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		14000	14300	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		322	256	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10700	11200	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2331-A-11	BA2331-A-12	----	----	----
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8411-011	VA23B8411-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.056	0.053	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		83.2	94.0	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		228	265	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		20.6	25.0	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.58	3.66	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		41.2	41.6	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3070	3510	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.1	2.3	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.8	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.33	7.45	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.46	7.49	----	----	----
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		1.81	1.62	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1690	1580	----	----	----
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		0.215	0.086	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.994	0.960	----	----	----
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		100	83.9	----	----	----
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		<0.25	<0.25	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2331-A-11	BA2331-A-12	----	----	----
					Client sampling date / time	02-Aug-2023 09:00	02-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8411-011	VA23B8411-012	--------	--------	--------
						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		0.78	<0.50	----	----	----
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	: **VA23B8411**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 10-Aug-2023 12:40
PO	: VANCO0000051998	Issue Date	: 18-Aug-2023 13:17
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

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

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	VA23B8411-001	BA2331-A-1	Antimony	7440-36-0	E440	34.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B8411-001	BA2331-A-1	Cadmium	7440-43-9	E440	39.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B8411-001	BA2331-A-1	Cobalt	7440-48-4	E440	133 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B8411-001	BA2331-A-1	Lead	7439-92-1	E440	104 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B8411-001	BA2331-A-1	Nickel	7440-02-0	E440	117 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B8411-001	BA2331-A-1	Silver	7440-22-4	E440	43.0 % 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.*

Reference Material (RM) Sample								
Metals	QC-MRG2-1088173 003	----	Cadmium	7440-43-9	E440	131 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-1	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-10	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-11	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-12	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-2	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-3	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-4	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-5	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-6	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-7	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-8	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2331-A-9	E510	02-Aug-2023	17-Aug-2023	28 days	15 days	✓	17-Aug-2023	28 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-1	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-10	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-11	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-12	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 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 BA2331-A-2	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-3	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-4	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-5	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-6	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-7	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-8	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2331-A-9	E440	02-Aug-2023	17-Aug-2023	180 days	15 days	✓	18-Aug-2023	180 days	16 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-1	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-10	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-11	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-12	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-2	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-3	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-4	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-5	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-6	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-7	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-8	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2331-A-9	E144	02-Aug-2023	----	----	----		16-Aug-2023	----	14 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-1	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-10	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-11	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-12	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-2	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-3	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-4	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-5	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-6	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-7	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-8	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2331-A-9	E108	02-Aug-2023	17-Aug-2023	30 days	15 days	✓	17-Aug-2023	30 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-1	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-10	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-11	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-12	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-2	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-3	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-4	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-5	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-6	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-7	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-8	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2331-A-9	E512	10-Aug-2023	16-Aug-2023	37 days	14 days	✓	16-Aug-2023	37 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-1	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-10	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-11	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-12	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-2	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-3	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-4	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-5	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-6	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2331-A-7	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2331-A-8	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2331-A-9	E444	10-Aug-2023	15-Aug-2023	189 days	13 days	✓	15-Aug-2023	189 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-1	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-10	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-11	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-12	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-2	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-3	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2331-A-4	EPP444	02-Aug-2023	10-Aug-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 : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2331-A-5	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2331-A-6	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2331-A-7	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2331-A-8	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2331-A-9	EPP444	02-Aug-2023	10-Aug-2023	----	----		----	28 days	9 days	✓

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	1088173	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1088174	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1088176	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1088172	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1088173	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1088174	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	1088176	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1088172	1	14	7.1	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1085035	1	13	7.6	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1088173	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1085036	1	13	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1088174	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1088176	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1085035	1	13	7.6	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1085036	1	13	7.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 ALS Environmental - Vancouver	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: **VA23B8411**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 10-Aug-2023 12:40
PO	: VANCO0000051998	Date Analysis Commenced	: 10-Aug-2023
C-O-C number	: ----	Issue Date	: 18-Aug-2023 13:18
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1088172)											
VA23B8411-001	BA2331-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.4	0.8%	5%	----
Physical Tests (QC Lot: 1088176)											
VA23B8411-001	BA2331-A-1	Moisture	----	E144	0.25	%	21.1	22.2	5.18%	20%	----
Metals (QC Lot: 1088173)											
VA23B8411-001	BA2331-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0507	0.0007	Diff <2x LOR	----
Metals (QC Lot: 1088174)											
VA23B8411-001	BA2331-A-1	Aluminum	7429-90-5	E440	50	mg/kg	29400	35000	17.3%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	110	78.2	34.2%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	22.2	19.7	12.2%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	489	447	8.95%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.34	0.08	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.17	10.4	12.7%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	170	172	1.42%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	13.2	8.88	39.4%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	138000	128000	7.04%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	176	178	1.23%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	160	32.0	133%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	3290	3830	15.0%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	51000	50800	0.444%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	1000	315	104%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	24.8	21.0	16.6%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	10800	9590	12.2%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	951	729	26.4%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	23.1	17.3	28.7%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	437	114	117%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	9240	8060	13.7%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5240	5130	2.13%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.43	0.08	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.96	3.85	43.0%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	14200	14000	1.39%	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: 1088174) - continued											
VA23B8411-001	BA2331-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	253	279	9.76%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11200	10300	8.40%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.052	0.002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	110	135	20.6%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	220	213	3.33%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	24.9	23.8	4.62%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.58	3.27	9.04%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	40.9	40.1	1.91%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3480	2700	25.4%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.0	0.1	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: 1088176)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1088173)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1088174)						
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: 1088174) - 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: 1085035)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1085036)						
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: 1088172)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1088176)									
Moisture	----	E144	0.25	%	50 %	99.5	90.0	110	----
Metals (QCLot: 1088173)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	94.0	80.0	120	----
Metals (QCLot: 1088174)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.4	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	95.1	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.5	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	89.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	90.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	85.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	94.7	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	93.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.0	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	92.8	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.1	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.5	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	94.2	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	94.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.8	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	96.6	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.2	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	95.7	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	89.9	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.0	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: 1088174) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	94.2	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	82.8	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.8	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.2	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	91.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.6	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.4	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	91.4	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: 1085035)										
VA23B8375-001	Anonymous	Mercury, TCLP	7439-97-6	E512	ND mg/L	0.001 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 1085036)										
VA23B8375-001	Anonymous	Antimony, TCLP	7440-36-0	E444	4.90 mg/L	5 mg/L	98.0	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.5 mg/L	12.5 mg/L	100	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.246 mg/L	0.25 mg/L	98.4	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.30 mg/L	10 mg/L	93.0	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.226 mg/L	0.25 mg/L	90.6	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	1.21 mg/L	1.25 mg/L	96.8	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.236 mg/L	0.25 mg/L	94.3	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.18 mg/L	2.5 mg/L	87.2	50.0	140	----
		Iron, TCLP	7439-89-6	E444	231 mg/L	250 mg/L	92.4	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.84 mg/L	10 mg/L	88.4	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	244 mg/L	250 mg/L	97.4	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.32 mg/L	2.5 mg/L	92.9	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.84 mg/L	5 mg/L	96.7	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.079 mg/L	0.1 mg/L	78.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	89.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.47 mg/L	5 mg/L	89.3	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	99.2	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	8.55 mg/L	10 mg/L	85.5	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	1.0 mg/L	1 mg/L	95.2	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1088173)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	96.3	70.0	130	----
Metals (QCLot: 1088174)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	113	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	96.4	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	101	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	122	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	# 131	70.0	130	MES
	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	114	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	96.7	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	95.0	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	101	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	107	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	100	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	96.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	99.9	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	96.4	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	94.5	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	82.7	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	123	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Qualifier
Metals (QCLot: 1088174) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	99.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.7	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	90.8	70.0	130	----

Qualifiers

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

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division Vancouver

Work Order Reference

VA23B8411

Telephone : +1 604 253 4188

Report To		Report Format / Distribution	Service Requested (Rush for r
Company:	Covanta Energy	☐ Standard ☐ Other	◉ Regular (Standard Turnaround Times -
Contact:	Nicole Victor / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surc
Address:	5150 Riverbend Drive	Email 1: nvictor@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surc
	Burnaby BC	Email 2: ofetherstonhaugh@covanta.com	○ Same Day or Weekend Emergency - Con
Phone:	604-521-1025 Fax:	Email 3: dskrypnyk@covanta.com	Analys
	☐ Yes ☐ No	brent.kirkpatrick@metrovancouver.org	
		Sarah.Wellman@metrovancouver.org	

Invoice To	Same as Report ?	Client / Project Information	Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:	
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite	
Contact:		LSD: (includes 2:1 pH)	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA2331-A-1	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-2	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-3	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-4	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-5	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-6	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-7	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-8	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-9	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-10	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-11	02-Aug-23	9:00	Soil	X	X		X	1
	BA2331-A-12	02-Aug-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
	10-Aug-23	0940	JL	AUG 10 2023	1240 pm	20,20 °C				