metrovancouver

Bottom Ash Data

2023 Week 34

The following analytical report represents bottom ash composite results for week 34 of 2023 (August 20, 2023 to August 26, 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	: **VA23C0291**	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	: 30-Aug-2023 11:50
PO	: VANCO0000051998	Date Analysis Commenced	: 31-Aug-2023
C-O-C number	: ----	Issue Date	: 07-Sep-2023 23:08
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*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - 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	BA2334-A-1	BA2334-A-2	BA2334-A-3	BA2334-A-4	BA2334-A-5
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
						VA23C0291-001	VA23C0291-002	VA23C0291-003	VA23C0291-004	VA23C0291-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		19.8	22.8	21.2	17.8	19.6
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.9	11.9	12.0	12.0	12.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		34000	40700	35500	42800	30100
Antimony	7440-36-0	E440/VA	0.10	mg/kg		105	99.5	109	115	93.2
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		25.7	24.0	26.2	23.1	25.1
Barium	7440-39-3	E440/VA	0.50	mg/kg		625	504	511	641	511
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.34	0.34	0.40	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.21	30.5	8.83	8.20	9.68
Boron	7440-42-8	E440/VA	5.0	mg/kg		170	230	166	256	146
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		9.99	7.81	10.1	8.24	9.16
Calcium	7440-70-2	E440/VA	50	mg/kg		137000	128000	148000	152000	135000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		353	147	135	141	140
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		29.3	119	517	45.2	31.5
Copper	7440-50-8	E440/VA	0.50	mg/kg		3720	1040	1820	2410	3510
Iron	7439-89-6	E440/VA	50	mg/kg		43100	55800	59200	64800	59000
Lead	7439-92-1	E440/VA	0.50	mg/kg		480	932	436	498	1080
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.8	24.1	35.5	22.3	21.4
Magnesium	7439-95-4	E440/VA	20	mg/kg		12400	10600	11300	11600	10800
Manganese	7439-96-5	E440/VA	1.0	mg/kg		754	804	675	792	742
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	0.0903
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		22.7	22.6	19.0	20.2	19.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg		167	105	121	136	212
Phosphorus	7723-14-0	E440/VA	50	mg/kg		10900	8200	10600	9400	9350
Potassium	7440-09-7	E440/VA	100	mg/kg		6440	5400	6000	5640	5620
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.30	0.29	0.32	0.32	0.36
Silver	7440-22-4	E440/VA	0.10	mg/kg		6.81	2.94	4.22	3.38	3.46
Sodium	7440-23-5	E440/VA	50	mg/kg		18600	17100	17300	18700	17300
Strontium	7440-24-6	E440/VA	0.50	mg/kg		321	270	328	313	307

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2334-A-1	BA2334-A-2	BA2334-A-3	BA2334-A-4	BA2334-A-5
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
						VA23C0291-001	VA23C0291-002	VA23C0291-003	VA23C0291-004	VA23C0291-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13300	11400	13500	12400	12200
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		251	82.0	96.2	130	115
Titanium	7440-32-6	E440/VA	1.0	mg/kg		254	325	312	296	184
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		3.98	4.23	4.92	3.88	5.16
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.43	3.07	3.39	3.26	3.23
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		46.9	40.4	58.3	41.2	40.8
Zinc	7440-66-6	E440/VA	2.0	mg/kg		7110	5290	3220	5560	5200
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.7	2.7	2.7	2.8	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.0	11.9	11.9	11.9	11.9
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.29	6.91	7.80	8.77	8.39
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.82	7.09	6.74	6.55	6.67
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		2.23	2.37	2.28	2.20	2.53
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.090	0.071	0.086	0.086	0.110
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1990	2070	2040	2020	1920
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		0.748	0.689	0.575	0.807	0.838
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.831	0.818	0.901	0.748	0.845
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		114	114	113	117	115
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		0.27	<0.25	0.32	0.39	0.32
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	BA2334-A-1	BA2334-A-2	BA2334-A-3	BA2334-A-4	BA2334-A-5
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0291-001	VA23C0291-002	VA23C0291-003	VA23C0291-004	VA23C0291-005
						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		10.5	3.02	14.2	13.6	10.4
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	BA2334-A-6	BA2334-A-7	BA2334-A-8	BA2334-A-9	BA2334-A-10
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
						VA23C0291-006	VA23C0291-007	VA23C0291-008	VA23C0291-009	VA23C0291-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.9	21.8	23.0	21.8	19.2
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.9	12.0	12.1	12.1	12.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		33100	46000	38300	38200	36600
Antimony	7440-36-0	E440/VA	0.10	mg/kg		111	110	119	108	94.1
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.8	25.4	22.8	23.8	20.6
Barium	7440-39-3	E440/VA	0.50	mg/kg		591	524	516	474	467
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.35	0.31	0.39	0.31
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.03	8.07	8.56	8.15	74.5
Boron	7440-42-8	E440/VA	5.0	mg/kg		181	234	166	221	147
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		10.0	8.99	9.22	8.96	8.05
Calcium	7440-70-2	E440/VA	50	mg/kg		155000	141000	150000	147000	139000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		149	161	156	170	137
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		117	148	157	113	25.0
Copper	7440-50-8	E440/VA	0.50	mg/kg		1300	1870	2550	2500	1080
Iron	7439-89-6	E440/VA	50	mg/kg		49600	54600	52000	41900	52800
Lead	7439-92-1	E440/VA	0.50	mg/kg		513	538	435	539	432
Lithium	7439-93-2	E440/VA	2.0	mg/kg		26.7	177	27.7	23.6	20.5
Magnesium	7439-95-4	E440/VA	20	mg/kg		12600	11800	12600	11600	10700
Manganese	7439-96-5	E440/VA	1.0	mg/kg		754	985	962	877	1010
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		22.2	22.7	19.8	23.1	17.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		121	192	140	168	139
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9780	9180	8500	8620	8840
Potassium	7440-09-7	E440/VA	100	mg/kg		5770	6220	5580	5360	5560
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.37	0.33	0.31	0.30	0.31
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.28	3.77	4.20	17.5	2.66
Sodium	7440-23-5	E440/VA	50	mg/kg		16700	17400	16700	17300	17000
Strontium	7440-24-6	E440/VA	0.50	mg/kg		306	305	318	309	273
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13900	12800	13400	12600	11800

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2334-A-6	BA2334-A-7	BA2334-A-8	BA2334-A-9	BA2334-A-10
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
						VA23C0291-006	VA23C0291-007	VA23C0291-008	VA23C0291-009	VA23C0291-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	0.055	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		90.6	128	110	90.0	94.5
Titanium	7440-32-6	E440/VA	1.0	mg/kg		278	274	291	253	261
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		5.26	5.82	4.42	5.17	4.21
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.37	3.24	3.29	3.37	3.17
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		45.7	43.0	45.0	49.7	40.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3470	7940	3580	3630	3050
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.3	2.9	2.2	2.4	2.2
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.9	12.0	12.0	11.9
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.25	8.77	8.74	8.25	8.33
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.87	7.13	7.02	6.81	6.84
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		2.22	2.15	2.17	2.21	2.25
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.071	0.055	0.071	0.084	0.105
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1990	2050	2010	2010	2040
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		0.738	0.676	0.461	0.840	1.04
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.960	0.988	0.924	0.820	1.09
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		111	114	117	117	114
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	0.27	0.41
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	BA2334-A-6	BA2334-A-7	BA2334-A-8	BA2334-A-9	BA2334-A-10
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00	23-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0291-006	VA23C0291-007	VA23C0291-008	VA23C0291-009	VA23C0291-010
						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		7.61	2.83	3.94	12.2	7.81
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: BA2334-A-11	BA2334-A-12	----	----	----
					Client sampling date / time: 23-Aug-2023 09:00	23-Aug-2023 09:00	----	----	----
					VA23C0291-011	VA23C0291-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144/VA	0.25	%	20.3	21.7	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	12.1	12.0	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	41100	28600	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	94.7	98.8	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	21.9	24.2	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	496	454	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.34	0.34	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.74	7.67	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	212	180	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	8.90	7.28	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	145000	133000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	157	179	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	47.1	156	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	2040	1610	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	43700	41200	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	466	389	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	23.2	25.0	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10800	10400	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	714	732	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	20.7	38.3	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	200	322	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9440	10000	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5410	5430	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.25	0.32	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.37	2.70	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	17500	16500	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	290	281	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12100	12000	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2334-A-11	BA2334-A-12	----	----	----
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0291-011	VA23C0291-012	--------	--------	--------
						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		83.5	80.5	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		343	169	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		4.32	5.73	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.28	3.30	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		45.6	43.7	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3150	3100	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.7	1.7	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	12.0	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.40	8.96	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.09	6.93	----	----	----
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		2.03	2.42	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.059	0.103	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1800	2120	----	----	----
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		0.782	0.576	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.877	0.686	----	----	----
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		108	118	----	----	----
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	0.28	----	----	----
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	BA2334-A-11	BA2334-A-12	----	----	----
					Client sampling date / time	23-Aug-2023 09:00	23-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0291-011	VA23C0291-012	--------	--------	--------
						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		3.92	6.69	----	----	----
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	: **VA23C0291**	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	: 30-Aug-2023 11:50
PO	: VANCO0000051998	Issue Date	: 07-Sep-2023 23:08
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	VA23C0291-001	BA2334-A-1	Chromium	7440-47-3	E440	62.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C0291-001	BA2334-A-1	Cobalt	7440-48-4	E440	145 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C0291-001	BA2334-A-1	Silver	7440-22-4	E440	42.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C0291-001	BA2334-A-1	Tin	7440-31-5	E440	97.0 % 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.*

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 BA2334-A-1	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-10	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-11	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-12	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-2	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-3	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-4	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-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 BA2334-A-5	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-6	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-7	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-8	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2334-A-9	E510	23-Aug-2023	06-Sep-2023	28 days	14 days	✓	07-Sep-2023	28 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-1	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-10	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-11	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-12	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-2	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-3	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-4	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-5	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-6	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-7	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-8	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2334-A-9	E440	23-Aug-2023	06-Sep-2023	180 days	14 days	✓	07-Sep-2023	180 days	15 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-1	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	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
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-10	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-11	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-12	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-2	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-3	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-4	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-5	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-6	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-7	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	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
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-8	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2334-A-9	E144	23-Aug-2023	----	----	----		05-Sep-2023	----	13 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-1	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-10	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-11	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-12	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-2	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-3	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-4	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 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
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-5	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-6	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-7	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-8	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2334-A-9	E108	23-Aug-2023	06-Sep-2023	30 days	14 days	✓	06-Sep-2023	30 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2334-A-1	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2334-A-10	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2334-A-11	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2334-A-12	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-2	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-3	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-4	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-5	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-6	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-7	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-8	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2334-A-9	E512	31-Aug-2023	01-Sep-2023	36 days	9 days	✓	01-Sep-2023	36 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2334-A-1	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-10	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-11	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-12	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-2	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-3	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-4	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-5	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-6	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2334-A-7	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2334-A-8	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 days	9 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2334-A-9	E444	31-Aug-2023	01-Sep-2023	188 days	9 days	✓	01-Sep-2023	188 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)										
BA2334-A-1	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-10	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-11	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-12	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-2	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-3	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2334-A-4	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2334-A-5	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2334-A-6	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2334-A-7	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2334-A-8	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2334-A-9	EPP444	23-Aug-2023	31-Aug-2023	----	----		----	28 days	8 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	1119185	1	17	5.8	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1119186	1	17	5.8	5.0	✓
Moisture Content by Gravimetry	E144	1119188	1	17	5.8	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1119187	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1119185	2	17	11.7	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1119186	2	17	11.7	10.0	✓
Moisture Content by Gravimetry	E144	1119188	1	17	5.8	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1119187	1	17	5.8	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1114938	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1119185	1	17	5.8	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1114941	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1119186	1	17	5.8	5.0	✓
Moisture Content by Gravimetry	E144	1119188	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1114938	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1114941	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 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.

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QUALITY CONTROL REPORT

Work Order	: **VA23C0291**	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	: 30-Aug-2023 11:50
PO	: VANCO0000051998	Date Analysis Commenced	: 31-Aug-2023
C-O-C number	: ----	Issue Date	: 07-Sep-2023 23:08
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*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - 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: 1119187)											
VA23C0291-001	BA2334-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	11.9	0.3%	5%	----
Physical Tests (QC Lot: 1119188)											
VA23C0291-001	BA2334-A-1	Moisture	----	E144	0.25	%	19.8	22.4	12.2%	20%	----
Metals (QC Lot: 1119185)											
VA23C0291-001	BA2334-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1119186)											
VA23C0291-001	BA2334-A-1	Aluminum	7429-90-5	E440	50	mg/kg	34000	44500	26.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	105	113	7.49%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	25.7	23.3	9.67%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	625	469	28.6%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.35	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.21	8.85	3.98%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	170	186	9.09%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	9.99	11.0	9.37%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	137000	141000	3.03%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	353	184	62.9%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	29.3	183	145%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	3720	2760	29.4%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	43100	49100	13.0%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	480	484	0.854%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	24.8	30.0	18.7%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12400	12000	3.39%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	754	802	6.08%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	22.7	25.8	12.7%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	167	143	15.3%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	10900	9640	12.1%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	6440	5450	16.6%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.36	0.06	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	6.81	4.44	42.1%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	18600	16500	11.8%	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: 1119186) - continued											
VA23C0291-001	BA2334-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	321	314	2.08%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	13300	13600	2.00%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	251	87.1	97.0%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	254	258	1.37%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	3.98	4.33	8.44%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.43	3.41	0.550%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	46.9	44.4	5.63%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	7110	9230	25.9%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.7	3.4	1.7	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: 1119188)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1119185)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1119186)						
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: 1119186) - 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: 1114938)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1114941)						
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: 1119187)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1119188)									
Moisture	----	E144	0.25	%	50 %	93.2	90.0	110	----
Metals (QCLot: 1119185)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	106	80.0	120	----
Metals (QCLot: 1119186)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.3	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.2	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	111	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	87.4	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	94.1	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	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	110	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	91.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	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	90.5	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	108	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	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: 1119186) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	116	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	98.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	94.9	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	100	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	100	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: 1114938)										
VA23C0291-001	BA2334-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----
TCLP Metals (QCLot: 1114941)										
VA23C0291-001	BA2334-A-1	Antimony, TCLP	7440-36-0	E444	5.12 mg/L	5 mg/L	102	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.3 mg/L	5 mg/L	106	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.9 mg/L	12.5 mg/L	95.5	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.251 mg/L	0.25 mg/L	100	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.77 mg/L	10 mg/L	97.7	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.246 mg/L	0.25 mg/L	98.4	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	2.30 mg/L	2.5 mg/L	92.1	50.0	140	----
		Iron, TCLP	7439-89-6	E444	254 mg/L	250 mg/L	102	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.40 mg/L	10 mg/L	94.0	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	270 mg/L	250 mg/L	108	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.46 mg/L	2.5 mg/L	98.5	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.30 mg/L	5 mg/L	106	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.092 mg/L	0.1 mg/L	92.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	90.8	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.70 mg/L	5 mg/L	94.1	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.77 mg/L	0.75 mg/L	103	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	0.9 mg/L	1 mg/L	93.0	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: 1119185)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 1119186)									
	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	96.7	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	105	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	99.9	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	121	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	102	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	105	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	98.7	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	108	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	113	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	96.6	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	110	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	94.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	98.4	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	125	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Reference Material (RM) Report: Qualifier
Metals (QCLot: 1119186) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	112	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	99.3	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	112	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:		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
	BA2334-A-1	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-2	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-3	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-4	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-5	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-6	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-7	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-8	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-9	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-10	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-11	23-Aug-23	9:00	Soil	X	X		X	1
	BA2334-A-12	23-Aug-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23C0291

Telephone : +1 604 253 4188

Special Instructions / ME-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
	30-Aug-23	0900				°C		8/30/23		

GENF 20.00 Front

No jcpall