metrovancouver

Bottom Ash Data

2023 Week 45

The following analytical report represents bottom ash composite results for week 45 of 2023 (November 5, 2023 to November 11 2023).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C7548**	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	: 15-Nov-2023 11:55
PO	: VANCO0000051998	Date Analysis Commenced	: 18-Nov-2023
C-O-C number	: ----	Issue Date	: 25-Nov-2023 09:27
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
Martina Gershon	Analsyt	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2345-A-1	BA2345-A-2	BA2345-A-3	BA2345-A-4	BA2345-A-5
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
						VA23C7548-001	VA23C7548-002	VA23C7548-003	VA23C7548-004	VA23C7548-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		29.9	30.2	27.9	29.8	30.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.1	11.1	11.1	11.0	11.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		31700	30000	36100	27600	32500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		110	144	144	116	114
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		17.1	16.9	18.0	19.9	16.8
Barium	7440-39-3	E440/VA	0.50	mg/kg		519	477	517	409	428
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.45	0.32	0.30	0.30
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		7.59	8.30	8.17	8.33	8.67
Boron	7440-42-8	E440/VA	5.0	mg/kg		142	141	144	149	141
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		275	7.61	8.46	7.28	6.31
Calcium	7440-70-2	E440/VA	50	mg/kg		113000	123000	112000	115000	106000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		223	142	191	131	145
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		207	272	52.7	56.8	282
Copper	7440-50-8	E440/VA	0.50	mg/kg		3290	2550	1300	1320	2360
Iron	7439-89-6	E440/VA	50	mg/kg		58600	58200	46200	63800	69400
Lead	7439-92-1	E440/VA	0.50	mg/kg		304	488	590	334	1100
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.4	36.2	19.7	19.2	24.1
Magnesium	7439-95-4	E440/VA	20	mg/kg		10900	12400	10100	9780	9570
Manganese	7439-96-5	E440/VA	1.0	mg/kg		739	902	697	768	1070
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		30.4	17.4	41.6	25.6	40.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		168	952	152	111	338
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7700	8390	8200	8250	7460
Potassium	7440-09-7	E440/VA	100	mg/kg		5270	5720	5180	5050	4750
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.46	0.33	0.43	0.35	0.39
Silver	7440-22-4	E440/VA	0.10	mg/kg		8.20	3.39	5.40	3.22	4.87
Sodium	7440-23-5	E440/VA	50	mg/kg		14900	14900	15300	13800	13600
Strontium	7440-24-6	E440/VA	0.50	mg/kg		273	265	351	244	288

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2345-A-1	BA2345-A-2	BA2345-A-3	BA2345-A-4	BA2345-A-5
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
						VA23C7548-001	VA23C7548-002	VA23C7548-003	VA23C7548-004	VA23C7548-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13000	12000	12200	12400	12900
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	0.132
Tin	7440-31-5	E440/VA	2.0	mg/kg		98.3	119	235	96.5	101
Titanium	7440-32-6	E440/VA	1.0	mg/kg		390	346	304	249	288
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		7.20	8.83	8.14	7.63	9.02
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.75	2.94	2.85	2.84	2.63
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		43.7	42.0	39.6	35.9	38.1
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3320	2820	3570	3680	12900
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.3	1.1	1.9	2.0	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.4	11.4	11.5	11.5	11.5
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.62	6.38	6.65	6.56	6.53
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		6.81	6.66	7.20	6.74	6.77
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		1.95	1.90	1.86	1.88	1.85
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.080	0.103	0.239	0.085	0.108
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1980	1960	1910	2070	2020
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		3.21	1.58	0.749	0.916	0.594
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.894	0.788	0.643	0.672	0.731
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		109	110	102	113	110
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		0.33	0.49	0.29	0.45	0.38
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	BA2345-A-1	BA2345-A-2	BA2345-A-3	BA2345-A-4	BA2345-A-5
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7548-001	VA23C7548-002	VA23C7548-003	VA23C7548-004	VA23C7548-005
						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		10.3	16.6	1.80	17.1	15.1
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	BA2345-A-6	BA2345-A-7	BA2345-A-8	BA2345-A-9	BA2345-A-10
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
						VA23C7548-006	VA23C7548-007	VA23C7548-008	VA23C7548-009	VA23C7548-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		30.3	29.3	29.3	28.1	26.8
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.1	11.4	11.1	11.4	11.2
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		32900	34700	35800	34900	34400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		125	126	154	114	118
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		18.5	18.9	23.3	134	19.8
Barium	7440-39-3	E440/VA	0.50	mg/kg		413	506	457	542	507
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.29	0.35	0.79	0.35	0.31
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.74	8.59	11.7	7.90	8.27
Boron	7440-42-8	E440/VA	5.0	mg/kg		148	140	150	196	150
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		7.07	7.35	12.9	7.56	9.08
Calcium	7440-70-2	E440/VA	50	mg/kg		102000	112000	125000	110000	120000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		191	165	174	163	136
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		197	162	126	72.8	37.8
Copper	7440-50-8	E440/VA	0.50	mg/kg		1450	1730	2850	34700	1350
Iron	7439-89-6	E440/VA	50	mg/kg		53200	55800	58400	63200	54000
Lead	7439-92-1	E440/VA	0.50	mg/kg		583	421	423	355	488
Lithium	7439-93-2	E440/VA	2.0	mg/kg		23.1	24.5	24.9	31.2	25.9
Magnesium	7439-95-4	E440/VA	20	mg/kg		9770	10800	11800	10100	10800
Manganese	7439-96-5	E440/VA	1.0	mg/kg		830	818	771	930	811
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		26.9	24.8	37.4	19.1	22.7
Nickel	7440-02-0	E440/VA	0.50	mg/kg		186	180	242	139	166
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7590	7650	8810	7470	8700
Potassium	7440-09-7	E440/VA	100	mg/kg		4820	5000	5750	4670	5470
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.37	0.42	0.60	0.66	0.35
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.18	3.99	3.82	4.95	2.93
Sodium	7440-23-5	E440/VA	50	mg/kg		13900	14100	15200	13500	14600
Strontium	7440-24-6	E440/VA	0.50	mg/kg		278	587	332	288	266
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12400	12200	14800	14500	14000

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2345-A-6	BA2345-A-7	BA2345-A-8	BA2345-A-9	BA2345-A-10
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
						VA23C7548-006	VA23C7548-007	VA23C7548-008	VA23C7548-009	VA23C7548-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		282	94.6	122	111	102
Titanium	7440-32-6	E440/VA	1.0	mg/kg		238	341	263	375	301
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		7.31	7.30	9.35	11.6	18.0
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.70	2.98	3.21	3.03	3.05
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		38.9	49.2	42.3	35.0	40.0
Zinc	7440-66-6	E440/VA	2.0	mg/kg		2870	3450	4450	15000	3160
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.2	1.7	2.3	1.4	1.8
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.5	11.7	11.5	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.43	7.05	6.73	6.72	6.73
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		7.13	6.74	6.77	6.53	7.16
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		1.99	1.93	1.93	2.14	1.80
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.058	0.096	0.091	0.211	0.066
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2070	2020	1910	1930	1830
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		0.893	0.928	0.942	1.40	0.572
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.768	0.673	0.723	0.756	0.629
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		105	118	113	115	103
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		0.37	0.47	0.42	0.51	0.26
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	BA2345-A-6	BA2345-A-7	BA2345-A-8	BA2345-A-9	BA2345-A-10
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00	08-Nov-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7548-006	VA23C7548-007	VA23C7548-008	VA23C7548-009	VA23C7548-010
						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		3.95	14.0	22.3	18.2	3.05
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: BA2345-A-11	BA2345-A-12	----	----	----
					Client sampling date / time: 08-Nov-2023 09:00	08-Nov-2023 09:00	----	----	----
					VA23C7548-011	VA23C7548-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144/VA	0.25	%	28.8	29.4	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	11.1	11.6	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	28300	35800	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	145	128	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.5	22.1	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	374	470	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.35	0.34	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	10.6	9.49	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	176	183	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.3	9.50	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	127000	123000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	158	173	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	277	51.1	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	2410	1480	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	63600	62400	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	414	1250	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	43.5	20.6	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10700	11900	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	735	834	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	23.3	23.2	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	370	289	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9070	9090	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5480	5100	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.44	0.53	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.88	3.60	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	14300	13800	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	334	414	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	14800	12000	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2345-A-11	BA2345-A-12	----	----	----
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7548-011	VA23C7548-012	--------	--------	--------
						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		135	193	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		237	268	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		9.89	6.35	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.38	3.17	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		39.4	42.9	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3600	6400	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.5	2.6	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	11.8	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.87	7.56	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.63	7.29	----	----	----
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	1.84	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.123	0.054	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2010	1900	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.78	0.492	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.477	0.622	----	----	----
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		114	101	----	----	----
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		0.48	0.27	----	----	----
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	BA2345-A-11	BA2345-A-12	----	----	----
					Client sampling date / time	08-Nov-2023 09:00	08-Nov-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7548-011	VA23C7548-012	--------	--------	--------
						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		18.9	1.54	----	----	----
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	: **VA23C7548**	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	: 15-Nov-2023 11:55
PO	: VANCO0000051998	Issue Date	: 25-Nov-2023 09:27
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	VA23C7548-001	BA2345-A-1	Cadmium	7440-43-9	E440	189 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Cobalt	7440-48-4	E440	138 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Copper	7440-50-8	E440	95.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Iron	7439-89-6	E440	30.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Manganese	7439-96-5	E440	47.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Silver	7440-22-4	E440	73.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7548-001	BA2345-A-1	Tungsten	7440-33-7	E440	58.5 % DUP-H	30%	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 : Analytical Method / 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 BA2345-A-1	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-10	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-11	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-12	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-2	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-3	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-4	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2345-A-5	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-6	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-7	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-8	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2345-A-9	E510	08-Nov-2023	23-Nov-2023	28 days	15 days	✓	23-Nov-2023	28 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-1	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-10	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-11	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-12	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2345-A-2	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-3	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-4	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-5	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-6	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-7	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-8	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2345-A-9	E440	08-Nov-2023	23-Nov-2023	180 days	15 days	✓	23-Nov-2023	180 days	15 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-1	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2345-A-10	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-11	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-12	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-2	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-3	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-4	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-5	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-6	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-7	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2345-A-8	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2345-A-9	E144	08-Nov-2023	----	----	----		22-Nov-2023	----	14 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-1	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-10	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-11	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-12	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-2	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-3	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-4	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2345-A-5	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-6	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-7	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-8	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2345-A-9	E108	08-Nov-2023	23-Nov-2023	30 days	15 days	✓	23-Nov-2023	30 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-1	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-10	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-11	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-12	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2345-A-2	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-3	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-4	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-5	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-6	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-7	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-8	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2345-A-9	E512	18-Nov-2023	20-Nov-2023	38 days	12 days	✓	20-Nov-2023	38 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-1	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2345-A-10	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-11	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-12	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-2	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-3	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-4	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-5	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-6	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-7	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2345-A-8	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2345-A-9	E444	18-Nov-2023	20-Nov-2023	190 days	12 days	✓	20-Nov-2023	190 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) BA2345-A-1	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-10	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-11	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-12	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-2	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-3	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-4	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-5	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-6	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-7	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-8	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2345-A-9	EPP444	08-Nov-2023	18-Nov-2023	----	----		----	28 days	10 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	1248671	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1248672	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1248677	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1248676	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1248671	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1248672	2	19	10.5	10.0	✓
Moisture Content by Gravimetry	E144	1248677	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1248676	1	12	8.3	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1244945	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1248671	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1244946	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1248672	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1248677	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1244945	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1244946	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.

QUALITY CONTROL REPORT

Work Order	: **VA23C7548**	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	: 15-Nov-2023 11:55
PO	: VANCO0000051998	Date Analysis Commenced	: 18-Nov-2023
C-O-C number	: ----	Issue Date	: 25-Nov-2023 09:28
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
Martina Gershon	Analsyt	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1248676)											
VA23C7548-001	BA2345-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.1	0.1%	5%	----
Physical Tests (QC Lot: 1248677)											
VA23C7548-001	BA2345-A-1	Moisture	----	E144	0.25	%	29.9	30.8	3.14%	20%	----
Metals (QC Lot: 1248671)											
VA23C7548-001	BA2345-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1248672)											
VA23C7548-001	BA2345-A-1	Aluminum	7429-90-5	E440	50	mg/kg	31700	33000	4.04%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	110	126	13.0%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	17.1	20.4	17.8%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	519	554	6.54%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.39	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	7.59	8.84	15.2%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	142	174	19.8%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	275	7.85	189%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	113000	123000	8.36%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	223	252	12.5%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	207	37.6	138%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	3290	1160	95.7%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	58600	43100	30.6%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	304	384	23.2%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	24.4	21.6	12.2%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	10900	10100	7.43%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	739	1200	47.4%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	30.4	23.6	25.4%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	168	126	28.6%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	7700	8280	7.18%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5270	6010	13.1%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.41	0.05	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	8.20	3.78	73.8%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	14900	15300	2.97%	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: 1248672) - continued											
VA23C7548-001	BA2345-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	273	274	0.393%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	13000	13500	3.87%	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	98.3	99.3	1.04%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	390	463	17.0%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	7.20	13.1	58.5%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	2.75	3.03	9.49%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	43.7	51.0	15.5%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3320	3410	2.82%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.3	0.08	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: 1248677)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1248671)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1248672)						
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: 1248672) - 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: 1244945)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1244946)						
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: 1248676)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	101	95.0	105	----
Physical Tests (QCLot: 1248677)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1248671)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	112	80.0	120	----
Metals (QCLot: 1248672)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.6	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	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	106	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	108	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.1	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	119	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: 1248672) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	112	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.7	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: 1244945)										
VA23C7548-001	BA2345-A-1	Mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	113	50.0	140	----
TCLP Metals (QCLot: 1244946)										
VA23C7548-001	BA2345-A-1	Antimony, TCLP	7440-36-0	E444	5.46 mg/L	5 mg/L	109	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	109	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.5 mg/L	12.5 mg/L	108	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.98 mg/L	10 mg/L	99.8	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.266 mg/L	0.25 mg/L	107	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	1.30 mg/L	1.25 mg/L	104	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.39 mg/L	2.5 mg/L	95.6	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	10.2 mg/L	10 mg/L	102	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	266 mg/L	250 mg/L	106	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.56 mg/L	2.5 mg/L	102	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.25 mg/L	5 mg/L	105	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.088 mg/L	0.1 mg/L	87.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.00 mg/L	5 mg/L	100	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.79 mg/L	0.75 mg/L	106	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	94.9	50.0	150	----

Reference Material (RM) Report

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

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1248671)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	107	70.0	130	----
Metals (QCLot: 1248672)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	108	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	106	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	103	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	108	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	97.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	113	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	100	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	95.2	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	103	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	111	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	98.6	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	107	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	98.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	112	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1248672) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	112	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	105	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	99.7	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	100.0	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC #

Page 1 of 1

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	
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			Sarah.Wellman@metrovancouver.org	

Invoice To	Same as Report ?	Client / Project Information	
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)	7548	ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

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
	BA2345-A-1	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-2	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-3	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-4	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-5	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-6	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-7	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-8	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-9	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-10	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-11	08-Nov-23	9:00	Soil	X	X				X						1
	BA2345-A-12	08-Nov-23	9:00	Soil	X	X				X						1

Environmental Division
Vancouver
Work Order Reference
VA23C7548

Telephone : +1 604 253 4188

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
KINGLIS	NOV 14 23	12:55	JC	NOV 15 2023	1155am	14 °C				

GENF 20.00 Front