

Bottom Ash Data

2023 Week 9

The following analytical report represents bottom ash composite results for week 9 of 2023 (February 26, 2023 to March 4, 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	: VA23A4870	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Mar-2023 14:10
PO	: VANCO0000051998	Date Analysis Commenced	: 08-Mar-2023
C-O-C number	: ----	Issue Date	: 14-Mar-2023 11:02
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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	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).

<i>Unit</i>	<i>Description</i>
%	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					Client sample ID	BA2309-A-1	BA2309-A-2	BA2309-A-3	BA2309-A-4	BA2309-A-5
(Matrix: Soil/Solid)					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-001	VA23A4870-002	VA23A4870-003	VA23A4870-004	VA23A4870-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	25.7	23.5	27.1	26.2	26.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.7	10.7	10.8	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	29200	31400	34100	54300	34200	
Antimony	7440-36-0	E440	0.10	mg/kg	192	190	192	156	151	
Arsenic	7440-38-2	E440	0.10	mg/kg	28.4	24.3	25.0	20.8	22.3	
Barium	7440-39-3	E440	0.50	mg/kg	426	459	478	474	486	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.54	0.38	0.35	0.34	
Bismuth	7440-69-9	E440	0.20	mg/kg	22.6	246	14.6	10.5	17.3	
Boron	7440-42-8	E440	5.0	mg/kg	169	153	166	126	173	
Cadmium	7440-43-9	E440	0.020	mg/kg	18.1	16.6	17.0	12.6	13.5	
Calcium	7440-70-2	E440	50	mg/kg	169000	159000	172000	155000	150000	
Chromium	7440-47-3	E440	0.50	mg/kg	164	367	161	190	125	
Cobalt	7440-48-4	E440	0.10	mg/kg	77.3	80.4	95.1	80.7	59.7	
Copper	7440-50-8	E440	0.50	mg/kg	2430	1790	1850	2270	1640	
Iron	7439-89-6	E440	50	mg/kg	50900	57300	44900	41100	49700	
Lead	7439-92-1	E440	0.50	mg/kg	562	2260	786	694	766	
Lithium	7439-93-2	E440	2.0	mg/kg	28.7	28.1	28.5	30.9	23.3	
Magnesium	7439-95-4	E440	20	mg/kg	12100	12100	12100	11200	9830	
Manganese	7439-96-5	E440	1.0	mg/kg	1170	746	738	926	728	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.164	0.159	0.200	0.126	0.126	
Molybdenum	7439-98-7	E440	0.10	mg/kg	23.6	24.8	23.4	20.0	18.4	
Nickel	7440-02-0	E440	0.50	mg/kg	188	242	159	202	130	
Phosphorus	7723-14-0	E440	50	mg/kg	14500	13200	14000	12600	13100	
Potassium	7440-09-7	E440	100	mg/kg	5670	5570	6570	5940	5970	
Selenium	7782-49-2	E440	0.20	mg/kg	0.69	0.63	0.56	0.54	0.58	
Silver	7440-22-4	E440	0.10	mg/kg	5.91	7.48	5.18	4.70	5.95	
Sodium	7440-23-5	E440	50	mg/kg	15300	14800	17500	15400	15900	
Strontium	7440-24-6	E440	0.50	mg/kg	304	303	305	301	266	



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2309-A-1	BA2309-A-2	BA2309-A-3	BA2309-A-4	BA2309-A-5
Client sampling date / time					01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-001	VA23A4870-002	VA23A4870-003	VA23A4870-004	VA23A4870-005
					Result	Result	Result	Result	Result
Metals									
Sulfur	7704-34-9	E440	1000	mg/kg	15900	13900	15400	12900	11700
Thallium	7440-28-0	E440	0.050	mg/kg	0.092	0.059	0.061	0.053	<0.050
Tin	7440-31-5	E440	2.0	mg/kg	186	252	164	174	134
Titanium	7440-32-6	E440	1.0	mg/kg	205	260	287	391	293
Tungsten	7440-33-7	E440	0.50	mg/kg	16.1	20.3	21.7	12.6	17.5
Uranium	7440-61-1	E440	0.050	mg/kg	4.66	4.36	4.62	3.94	3.72
Vanadium	7440-62-2	E440	0.20	mg/kg	46.4	42.4	44.4	44.0	36.2
Zinc	7440-66-6	E440	2.0	mg/kg	4960	4400	4660	3630	6990
Zirconium	7440-67-7	E440	1.0	mg/kg	2.2	2.3	2.1	4.8	2.8
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.6	11.7	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.71	6.09	7.01	6.29	7.21
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units	6.92	6.82	6.97	6.95	7.05
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.84	1.88	1.84	1.96	1.88
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.086	0.136	0.106	0.078	0.072
Calcium, TCLP	7440-70-2	E444	10	mg/L	2110	2160	2180	2240	2200
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.740	0.591	0.710	0.587	0.369
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.359	0.418	0.466	0.469	0.461
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	125	126	128	128	130
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.41	0.52	0.50	0.36	0.32
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA2309-A-1	BA2309-A-2	BA2309-A-3	BA2309-A-4	BA2309-A-5
					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-001	VA23A4870-002	VA23A4870-003	VA23A4870-004	VA23A4870-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	7.61	9.02	6.02	4.17	3.45	
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2309-A-6	BA2309-A-7	BA2309-A-8	BA2309-A-9	BA2309-A-10
Client sampling date / time					01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-006	VA23A4870-007	VA23A4870-008	VA23A4870-009	VA23A4870-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	26.3	26.7	25.5	22.4	25.0
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	10.7	10.7	10.8
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	31300	31600	33300	33500	38700
Antimony	7440-36-0	E440	0.10	mg/kg	186	181	210	178	191
Arsenic	7440-38-2	E440	0.10	mg/kg	26.8	25.1	23.6	27.1	24.3
Barium	7440-39-3	E440	0.50	mg/kg	415	442	547	576	541
Beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.37	0.35	0.41
Bismuth	7440-69-9	E440	0.20	mg/kg	11.9	14.4	17.0	12.2	11.5
Boron	7440-42-8	E440	5.0	mg/kg	162	148	150	186	212
Cadmium	7440-43-9	E440	0.020	mg/kg	16.3	17.0	19.1	16.3	14.6
Calcium	7440-70-2	E440	50	mg/kg	161000	165000	160000	159000	163000
Chromium	7440-47-3	E440	0.50	mg/kg	131	181	149	207	165
Cobalt	7440-48-4	E440	0.10	mg/kg	72.1	43.0	76.3	57.3	33.0
Copper	7440-50-8	E440	0.50	mg/kg	1630	3340	2000	1980	1990
Iron	7439-89-6	E440	50	mg/kg	42100	50400	49900	64800	53800
Lead	7439-92-1	E440	0.50	mg/kg	618	507	1170	529	481
Lithium	7439-93-2	E440	2.0	mg/kg	25.7	25.4	28.0	22.9	24.4
Magnesium	7439-95-4	E440	20	mg/kg	11600	11600	10900	11400	11900
Manganese	7439-96-5	E440	1.0	mg/kg	811	871	859	814	1070
Mercury	7439-97-6	E510	0.0500	mg/kg	0.164	0.164	0.160	0.149	0.116
Molybdenum	7439-98-7	E440	0.10	mg/kg	22.3	22.3	24.2	35.4	25.6
Nickel	7440-02-0	E440	0.50	mg/kg	156	132	134	160	154
Phosphorus	7723-14-0	E440	50	mg/kg	14100	15000	14000	13100	14500
Potassium	7440-09-7	E440	100	mg/kg	5880	6030	5540	6530	6640
Selenium	7782-49-2	E440	0.20	mg/kg	0.61	0.79	0.61	0.61	0.60
Silver	7440-22-4	E440	0.10	mg/kg	9.05	5.08	4.95	6.53	5.56
Sodium	7440-23-5	E440	50	mg/kg	15600	15800	15000	17300	17600
Strontium	7440-24-6	E440	0.50	mg/kg	296	298	283	406	344
Sulfur	7704-34-9	E440	1000	mg/kg	14000	14400	12900	13200	13900



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2309-A-6	BA2309-A-7	BA2309-A-8	BA2309-A-9	BA2309-A-10
Client sampling date / time					01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-006	VA23A4870-007	VA23A4870-008	VA23A4870-009	VA23A4870-010	
					Result	Result	Result	Result	Result	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.062	0.058	0.059	0.054	
Tin	7440-31-5	E440	2.0	mg/kg	150	454	143	188	196	
Titanium	7440-32-6	E440	1.0	mg/kg	236	265	307	320	312	
Tungsten	7440-33-7	E440	0.50	mg/kg	15.8	20.6	13.1	77.8	17.4	
Uranium	7440-61-1	E440	0.050	mg/kg	4.50	4.66	4.16	4.09	4.23	
Vanadium	7440-62-2	E440	0.20	mg/kg	41.2	44.7	40.8	44.0	39.9	
Zinc	7440-66-6	E440	2.0	mg/kg	3910	5180	3920	3930	3940	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.8	2.3	2.1	2.3	3.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.6	11.6	11.6	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.76	7.51	7.30	7.16	8.53	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.88	7.00	6.76	6.68	6.81	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.89	1.93	1.86	1.89	1.94	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.085	0.104	0.108	0.112	0.096	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2210	2220	2200	2150	2220	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.820	1.22	0.665	0.644	0.734	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.395	0.519	0.692	0.369	0.438	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	127	131	127	126	130	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.39	0.44	0.40	0.46	0.42	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA2309-A-6	BA2309-A-7	BA2309-A-8	BA2309-A-9	BA2309-A-10
					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00	01-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-006	VA23A4870-007	VA23A4870-008	VA23A4870-009	VA23A4870-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	7.91	7.85	11.0	16.7	9.78	
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BA2309-A-11	BA2309-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-011	VA23A4870-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
Moisture	----	E144	0.25	%	26.1	25.8	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	----	----	----	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	35500	37700	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	177	171	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	21.8	22.5	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	485	409	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.37	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	11.4	10.6	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	154	138	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	15.2	15.1	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	158000	161000	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	142	126	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	52.7	63.5	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	2560	2360	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	54700	43900	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	453	655	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	23.2	29.1	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	11100	11000	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	1380	942	----	----	----	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.187	0.137	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	20.1	23.5	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	196	147	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	13000	14300	----	----	----	
Potassium	7440-09-7	E440	100	mg/kg	5800	6170	----	----	----	
Selenium	7782-49-2	E440	0.20	mg/kg	0.54	0.60	----	----	----	
Silver	7440-22-4	E440	0.10	mg/kg	4.36	6.00	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	15200	15500	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	309	302	----	----	----	
Sulfur	7704-34-9	E440	1000	mg/kg	12800	13200	----	----	----	



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BA2309-A-11	BA2309-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-011	VA23A4870-012	-----	-----	-----	
					Result	Result	----	----	----	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.055	----	----	----	
Tin	7440-31-5	E440	2.0	mg/kg	215	286	----	----	----	
Titanium	7440-32-6	E440	1.0	mg/kg	254	240	----	----	----	
Tungsten	7440-33-7	E440	0.50	mg/kg	15.6	14.0	----	----	----	
Uranium	7440-61-1	E440	0.050	mg/kg	4.04	4.18	----	----	----	
Vanadium	7440-62-2	E440	0.20	mg/kg	40.0	40.6	----	----	----	
Zinc	7440-66-6	E440	2.0	mg/kg	5560	5280	----	----	----	
Zirconium	7440-67-7	E440	1.0	mg/kg	3.2	4.1	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.8	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.13	7.26	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	7.31	6.82	----	----	----	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	----	----	----	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.90	2.22	----	----	----	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.082	0.104	----	----	----	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2300	2220	----	----	----	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.396	1.06	----	----	----	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.450	0.526	----	----	----	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	131	127	----	----	----	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.28	0.50	----	----	----	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	----	----	----	
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----	



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA2309-A-11	BA2309-A-12	----	----	----
					Client sampling date / time	01-Mar-2023 09:00	01-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A4870-011	VA23A4870-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	1.66	7.54	----	----	----	
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

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



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA23A4870</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO0000051998</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 07-Mar-2023 14:10</p> <p>Issue Date : 14-Mar-2023 11:02</p>
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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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) 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	VA23A4870-001	BA2309-A-1	Cobalt	7440-48-4	E440	61.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A4870-001	BA2309-A-1	Copper	7440-50-8	E440	39.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A4870-001	BA2309-A-1	Manganese	7439-96-5	E440	39.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A4870-001	BA2309-A-1	Nickel	7440-02-0	E440	34.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A4870-001	BA2309-A-1	Strontium	7440-24-6	E440	40.2 % 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.

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-8559510 02	----	Silver	7440-22-4	E440	76.2 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-1	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-10	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-11	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-12	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-2	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-3	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-4	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-5	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-6	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-7	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-8	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2309-A-9	E510	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2309-A-1	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2309-A-10	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2309-A-11	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2309-A-12	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-2	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-3	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-4	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-5	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-6	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-7	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-8	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2309-A-9	E440	01-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2309-A-1	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----		



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-10	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-11	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-12	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-2	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-3	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-4	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-5	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-6	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2309-A-7	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2309-A-8	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2309-A-9	E144	01-Mar-2023	----	----	----		08-Mar-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-1	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-10	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-11	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-12	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-2	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-3	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-4	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-5	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-6	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-7	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-8	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2309-A-9	E108	01-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	30 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2309-A-1	E512	09-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-10	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-11	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-12	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-2	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-3	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-4	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-5	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-6	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-7	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-8	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2309-A-9	E512	08-Mar-2023	09-Mar-2023	----	----		09-Mar-2023	28 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-1	E444	09-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-10	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-11	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-12	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-2	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-3	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-4	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-5	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-6	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2309-A-7	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2309-A-8	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2309-A-9	E444	08-Mar-2023	09-Mar-2023	----	----		10-Mar-2023	180 days	9 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-1	EPP444	01-Mar-2023	09-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-10	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-11	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-12	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-2	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-3	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-4	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-5	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-6	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-7	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-8	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2309-A-9	EPP444	01-Mar-2023	08-Mar-2023	----	----		----	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	855951	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	855952	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	855954	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	855953	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	855951	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	855952	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	855954	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	855953	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	858113	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	855951	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	858114	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	855952	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	855954	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	858113	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	858114	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

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 Work Order : VA23A4870
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: VA23A4870	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Mar-2023 14:10
PO	: VANCO0000051998	Date Analysis Commenced	: 08-Mar-2023
C-O-C number	: ----	Issue Date	: 14-Mar-2023 11:02
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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	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: 855953)											
VA23A4870-001	BA2309-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	1.3%	5%	----
Physical Tests (QC Lot: 855954)											
VA23A4870-001	BA2309-A-1	Moisture	----	E144	0.25	%	25.7	26.6	3.44%	20%	----
Metals (QC Lot: 855951)											
VA23A4870-001	BA2309-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.164	0.136	0.0286	Diff <2x LOR	----
Metals (QC Lot: 855952)											
VA23A4870-001	BA2309-A-1	Aluminum	7429-90-5	E440	50	mg/kg	29200	32500	10.6%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	192	166	14.0%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	28.4	23.5	18.8%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	426	448	5.00%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.50	0.12	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	22.6	18.1	22.2%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	169	158	6.99%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	18.1	15.7	14.2%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	169000	160000	5.62%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	164	156	5.32%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	77.3	40.8	61.8%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2430	1620	39.9%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	50900	59900	16.3%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	562	470	17.8%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	28.7	26.3	8.79%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12100	11800	2.28%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1170	786	39.1%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	23.6	22.0	6.73%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	188	132	34.7%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	14500	14000	3.08%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5670	5810	2.37%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.69	0.52	0.17	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.91	5.20	12.8%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	15300	15300	0.523%	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: 855952) - continued											
VA23A4870-001	BA2309-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	304	456	40.2%	40%	DUP-H
		Sulfur	7704-34-9	E440	1000	mg/kg	15900	12700	22.5%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.092	0.061	0.030	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	186	143	26.4%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	205	229	10.7%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	16.1	13.7	16.1%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	4.66	4.26	8.97%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	46.4	43.6	6.17%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4960	5230	5.28%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.2	3.5	1.2	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: 855954)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 855951)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 855952)						
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: 855952) - 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: 858113)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 858114)						
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: 855953)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 855954)									
Moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
Metals (QCLot: 855951)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	89.4	80.0	120	----
Metals (QCLot: 855952)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	96.6	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	92.7	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	85.4	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	86.7	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	86.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	86.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	87.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	83.8	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	83.6	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	85.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	84.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	86.5	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	84.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	88.0	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	92.9	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.5	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	89.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	84.4	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	93.7	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	84.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.6	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	# 76.2	80.0	120	MES
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	90.9	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	87.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.8	80.0	120	----



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 855952) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	87.7	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	85.7	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	85.4	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	88.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	84.4	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	88.2	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	82.7	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	81.7	80.0	120	----

Qualifiers

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



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: 858113)										
VA23A4870-001	BA2309-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	102	50.0	140	----
TCLP Metals (QCLot: 858114)										
VA23A4870-001	BA2309-A-1	Antimony, TCLP	7440-36-0	E444	4.92 mg/L	5 mg/L	98.5	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.0	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.2 mg/L	12.5 mg/L	105	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.231 mg/L	0.25 mg/L	92.4	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.59 mg/L	10 mg/L	95.9	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.224 mg/L	0.25 mg/L	89.8	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	1.10 mg/L	1.25 mg/L	88.2	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	2.10 mg/L	2.5 mg/L	84.2	50.0	140	----
		Iron, TCLP	7439-89-6	E444	222 mg/L	250 mg/L	88.7	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.41 mg/L	10 mg/L	94.1	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	254 mg/L	250 mg/L	102	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.15 mg/L	2.5 mg/L	86.1	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.48 mg/L	5 mg/L	89.6	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.100 mg/L	0.1 mg/L	99.7	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	94.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.82 mg/L	5 mg/L	96.3	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.68 mg/L	0.75 mg/L	91.1	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	8.22 mg/L	10 mg/L	82.2	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.6	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:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 855951)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	94.8	70.0	130	----
Metals (QCLot: 855952)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	95.8	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	88.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	95.4	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	87.2	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	100	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	110	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	84.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	94.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	95.7	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	88.8	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	86.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	91.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	88.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	91.9	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	97.4	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	96.8	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	87.6	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	89.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	86.3	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	97.9	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	91.4	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	89.1	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	87.1	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	78.6	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	102	70.0	130	----

Page : 11 of 11
 Work Order : VA23A4870
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite




Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 855952) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	88.3	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	94.2	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	85.4	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	81.5	70.0	130	----



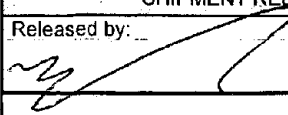

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Nicole Victor / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	nvictor@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:	Ejohanson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
			brent.kirkpatrick@metrovancover.org		Analysis Request
			Sarah.Wellman@metrovancover.org		

Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:			
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite			
Contact:		LSD: (includes 2:1 pH)			
Address:		Quote #:			
Phone:		Fax:			

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
BA2309-A-1	Environmental Division Vancouver Work Order Reference VA23A4870  Telephone : - 1 604 253 4188	01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-2		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-3		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-4		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-5		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-6		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-7		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-8		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-9		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-10		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-11		01-Mar-23	9:00	Soil	X	X	X	1	
BA2309-A-12		01-Mar-23	9:00	Soil	X	X	X	1	

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
 By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
 Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	7-Mar-23	0800		MAR - 7 2023	14:10	21 °C				