

Bottom Ash Data

2023 Week 23

The following analytical report represents bottom ash composite results for week 23 of 2023 (June 4, 2023 to June 10, 2023).

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



CERTIFICATE OF ANALYSIS

<p>Work Order : VA23B3420</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 11</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Ian Chen</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 14-Jun-2023 12:10</p> <p>Date Analysis Commenced : 15-Jun-2023</p> <p>Issue Date : 23-Jun-2023 15:12</p>
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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>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
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				
(Matrix: Soil/Solid)					BA2323-A-1	BA2323-A-2	BA2323-A-3	BA2323-A-4	BA2323-A-5
Client sampling date / time					07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-001	VA23B3420-002	VA23B3420-003	VA23B3420-004	VA23B3420-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	20.7	21.2	20.2	20.2	20.5
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	11.4	11.4	11.4	11.1	11.3
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	38200	33900	32400	28000	26800
Antimony	7440-36-0	E440/VA	0.10	mg/kg	100	114	113	100	115
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.3	26.3	25.8	25.7	32.6
Barium	7440-39-3	E440/VA	0.50	mg/kg	525	429	514	430	496
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.40	0.36	0.41	0.37	0.33
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.52	9.54	8.26	7.67	7.45
Boron	7440-42-8	E440/VA	5.0	mg/kg	192	184	196	165	171
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.2	11.1	11.5	59.6	11.7
Calcium	7440-70-2	E440/VA	50	mg/kg	128000	124000	128000	124000	125000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	165	230	144	760	236
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	458	114	250	118	91.1
Copper	7440-50-8	E440/VA	0.50	mg/kg	6600	2020	16100	7680	1860
Iron	7439-89-6	E440/VA	50	mg/kg	62400	59700	47500	50000	60600
Lead	7439-92-1	E440/VA	0.50	mg/kg	411	364	360	361	473
Lithium	7439-93-2	E440/VA	2.0	mg/kg	39.7	25.0	32.4	36.4	22.5
Magnesium	7439-95-4	E440/VA	20	mg/kg	11100	10600	11100	10500	10800
Manganese	7439-96-5	E440/VA	1.0	mg/kg	789	719	762	833	945
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.0635	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	25.0	25.6	22.0	24.4	27.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg	125	711	139	437	169
Phosphorus	7723-14-0	E440/VA	50	mg/kg	8600	9080	8430	9180	8860
Potassium	7440-09-7	E440/VA	100	mg/kg	5620	5410	5380	5620	5150
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.37	0.47	0.29	0.42	0.39
Silver	7440-22-4	E440/VA	0.10	mg/kg	5.58	6.09	3.94	4.10	11.7
Sodium	7440-23-5	E440/VA	50	mg/kg	15000	14700	15200	14600	14200
Strontium	7440-24-6	E440/VA	0.50	mg/kg	252	258	255	259	249



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BA2323-A-1	BA2323-A-2	BA2323-A-3	BA2323-A-4	BA2323-A-5
(Matrix: Soil/Solid)					Client sampling date / time	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-001	VA23B3420-002	VA23B3420-003	VA23B3420-004	VA23B3420-005	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12000	12000	11300	12400	12200	
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
Tin	7440-31-5	E440/VA	2.0	mg/kg	111	93.2	582	79.4	236	
Titanium	7440-32-6	E440/VA	1.0	mg/kg	276	249	259	168	190	
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	42.3	56.2	34.6	42.8	43.7	
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.78	4.21	3.74	3.98	4.11	
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	45.5	47.3	45.4	47.2	48.8	
Zinc	7440-66-6	E440/VA	2.0	mg/kg	4660	3640	4110	5390	4020	
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	1.7	2.4	1.7	2.0	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.7	11.6	11.7	11.7	11.6	
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	5.89	5.86	6.41	6.71	6.65	
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	6.51	6.56	6.72	6.46	6.49	
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	2.22	2.12	2.18	2.15	2.18	
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.216	0.147	0.275	0.245	0.195	
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2340	2120	2160	2140	2150	
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	1.84	1.15	0.933	1.08	1.17	
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.944	0.756	0.788	0.960	0.844	
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	132	120	121	123	125	
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	0.45	0.41	0.36	0.68	0.42	
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	BA2323-A-1	BA2323-A-2	BA2323-A-3	BA2323-A-4	BA2323-A-5
					Client sampling date / time	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-001	VA23B3420-002	VA23B3420-003	VA23B3420-004	VA23B3420-005	
					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	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<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	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	25.4	19.2	16.0	28.5	25.6	25.6
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L	<10	<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					Client sample ID				
(Matrix: Soil/Solid)					BA2323-A-6	BA2323-A-7	BA2323-A-8	BA2323-A-9	BA2323-A-10
Client sampling date / time					07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-006	VA23B3420-007	VA23B3420-008	VA23B3420-009	VA23B3420-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	---	E144/VA	0.25	%	21.7	21.5	21.3	21.9	21.0
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.4	11.1	11.1	11.1	11.1
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	29700	32000	36500	27200	26200
Antimony	7440-36-0	E440/VA	0.10	mg/kg	104	240	109	113	107
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	27.0	23.6	26.9	33.9	26.6
Barium	7440-39-3	E440/VA	0.50	mg/kg	549	508	487	437	426
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.37	0.39	0.35	0.36	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	16.3	10.7	10.6	7.29	12.9
Boron	7440-42-8	E440/VA	5.0	mg/kg	179	199	197	131	178
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.6	11.5	19.3	12.3	11.0
Calcium	7440-70-2	E440/VA	50	mg/kg	121000	128000	131000	118000	128000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	162	216	230	173	231
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	61.4	50.4	200	49.2	174
Copper	7440-50-8	E440/VA	0.50	mg/kg	1300	21100	1510	3740	5400
Iron	7439-89-6	E440/VA	50	mg/kg	55800	45000	62100	66300	50600
Lead	7439-92-1	E440/VA	0.50	mg/kg	433	698	437	820	513
Lithium	7439-93-2	E440/VA	2.0	mg/kg	21.6	42.6	27.1	23.7	37.7
Magnesium	7439-95-4	E440/VA	20	mg/kg	10300	10400	10900	9940	11000
Manganese	7439-96-5	E440/VA	1.0	mg/kg	703	688	717	768	1050
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0574	0.0717	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	27.2	22.0	26.4	32.9	31.1
Nickel	7440-02-0	E440/VA	0.50	mg/kg	162	111	365	198	382
Phosphorus	7723-14-0	E440/VA	50	mg/kg	8220	9200	8850	8580	7940
Potassium	7440-09-7	E440/VA	100	mg/kg	5310	5680	5660	5350	5620
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.39	0.34	0.49	0.60	0.42
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.35	23.0	4.66	7.20	4.65
Sodium	7440-23-5	E440/VA	50	mg/kg	14400	15600	15300	14400	15400
Strontium	7440-24-6	E440/VA	0.50	mg/kg	259	258	264	229	258
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11500	11500	13500	12300	12600



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2323-A-6	BA2323-A-7	BA2323-A-8	BA2323-A-9	BA2323-A-10
Client sampling date / time					07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-006	VA23B3420-007	VA23B3420-008	VA23B3420-009	VA23B3420-010
					Result	Result	Result	Result	Result
Metals									
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.066
Tin	7440-31-5	E440/VA	2.0	mg/kg	93.6	1200	305	118	91.7
Titanium	7440-32-6	E440/VA	1.0	mg/kg	267	177	259	199	275
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	36.1	29.9	44.4	38.9	50.5
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.83	4.18	4.41	4.11	4.35
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	46.0	47.4	46.2	42.9	45.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3710	3210	3880	4240	5160
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	1.3	3.3	2.3	1.9	1.6
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.8	11.5	11.6	11.5	11.6
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	7.21	6.49	6.80	6.40	6.41
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	6.55	6.43	6.42	6.55	6.45
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	2.17	2.30	2.25	2.19	2.19
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.184	0.204	0.195	0.164	0.411
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2160	2220	2230	2180	2130
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	1.22	1.16	1.70	1.12	1.11
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.940	0.928	0.938	0.886	0.877
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	124	126	127	124	121
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	0.63	0.45	0.49	0.46	0.44
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	BA2323-A-6	BA2323-A-7	BA2323-A-8	BA2323-A-9	BA2323-A-10
					Client sampling date / time	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00	07-Jun-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-006	VA23B3420-007	VA23B3420-008	VA23B3420-009	VA23B3420-010	
					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	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<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	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	23.7	29.4	25.3	19.3	33.3	
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L	<10	<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

Client sample ID

(Matrix: Soil/Solid)

					BA2323-A-11	BA2323-A-12	----	----	----
Client sampling date / time					07-Jun-2023 09:00	07-Jun-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-011	VA23B3420-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	21.1	21.8	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.1	11.3	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	31300	34900	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	145	95.0	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	34.7	24.7	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	382	477	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.35	0.38	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	11.0	6.63	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	267	164	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	16.3	22.2	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	132000	126000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	166	134	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	91.7	65.6	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	2740	2320	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	51400	44600	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	526	550	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	26.0	25.4	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	11400	11000	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	755	791	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	0.0732	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	25.3	26.2	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	154	129	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9000	9180	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5800	5500	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.58	0.40	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	4.98	4.10	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	16000	15000	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	253	271	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	14400	11300	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2323-A-11	BA2323-A-12	----	----	----
Client sampling date / time					07-Jun-2023 09:00	07-Jun-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-011	VA23B3420-012	-----	-----	-----
					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	101	77.8	---	---	---
Titanium	7440-32-6	E440/VA	1.0	mg/kg	268	212	---	---	---
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	45.8	33.0	---	---	---
Uranium	7440-61-1	E440/VA	0.050	mg/kg	4.22	4.21	---	---	---
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	48.0	49.0	---	---	---
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3890	3230	---	---	---
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.2	3.3	---	---	---
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.5	11.7	---	---	---
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.50	6.51	---	---	---
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.90	2.90	---	---	---
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.54	6.37	---	---	---
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	2.24	2.20	---	---	---
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.207	0.194	---	---	---
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2200	2160	---	---	---
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	1.67	1.23	---	---	---
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.874	0.958	---	---	---
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	128	126	---	---	---
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	0.44	0.50	---	---	---
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					Client sample ID		BA2323-A-11	BA2323-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		07-Jun-2023 09:00	07-Jun-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3420-011	VA23B3420-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
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	23.9	27.6	----	----	----	----	----
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.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA23B3420</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 : Ian Chen</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 14-Jun-2023 12:10</p> <p>Issue Date : 23-Jun-2023 15:12</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 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	VA23B3420-001	BA2323-A-1	Antimony	7440-36-0	E440	33.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Bismuth	7440-69-9	E440	45.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Cobalt	7440-48-4	E440	160 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Copper	7440-50-8	E440	125 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Lead	7439-92-1	E440	47.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Lithium	7439-93-2	E440	34.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Manganese	7439-96-5	E440	32.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Molybdenum	7439-98-7	E440	87.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Nickel	7440-02-0	E440	32.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B3420-001	BA2323-A-1	Titanium	7440-32-6	E440	46.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-1	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-10	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-11	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-12	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-2	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-3	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2323-A-4	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✓



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2323-A-5	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2323-A-6	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2323-A-7	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2323-A-8	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2323-A-9	E510	07-Jun-2023	21-Jun-2023	----	----		22-Jun-2023	28 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2323-A-1	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2323-A-10	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2323-A-11	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2323-A-12	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-2	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-3	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-4	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-5	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-6	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-7	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-8	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2323-A-9	E440	07-Jun-2023	21-Jun-2023	----	----		23-Jun-2023	180 days	16 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2323-A-1	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-10	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-11	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-12	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-2	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-3	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-4	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-5	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-6	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2323-A-7	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2323-A-8	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2323-A-9	E144	07-Jun-2023	----	----	----		20-Jun-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-1	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-10	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-11	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-12	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-2	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-3	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-4	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-5	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-6	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-7	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-8	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2323-A-9	E108	07-Jun-2023	21-Jun-2023	----	----		21-Jun-2023	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-1	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-10	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-11	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-12	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-2	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-3	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-4	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-5	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-6	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-7	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-8	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2323-A-9	E512	15-Jun-2023	19-Jun-2023	----	----		19-Jun-2023	28 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-1	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-10	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-11	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-12	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-2	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-3	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-4	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-5	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-6	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-7	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-8	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2323-A-9	E444	15-Jun-2023	19-Jun-2023	----	----		20-Jun-2023	180 days	13 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-1	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-10	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-11	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-12	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-2	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-3	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-4	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		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) BA2323-A-5	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-6	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-7	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-8	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2323-A-9	EPP444	07-Jun-2023	15-Jun-2023	----	----		----	----	----	

Legend & Qualifier Definitions

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



Quality Control Parameter Frequency Compliance

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

Matrix: **Soil/Solid**

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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	998646	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	998647	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	998650	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	998649	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	998646	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	998647	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	998650	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	998649	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	995540	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	998646	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	995541	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	998647	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	998650	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	995540	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	995541	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, 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.



<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	: VA23B3420	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 14-Jun-2023 12:10
PO	: VANCO0000051998	Date Analysis Commenced	: 15-Jun-2023
C-O-C number	: ----	Issue Date	: 23-Jun-2023 15:12
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>
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
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: 998649)											
VA23B3420-001	BA2323-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	0.8%	5%	----
Physical Tests (QC Lot: 998650)											
VA23B3420-001	BA2323-A-1	Moisture	----	E144	0.25	%	20.7	20.7	0.0476%	20%	----
Metals (QC Lot: 998646)											
VA23B3420-001	BA2323-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 998647)											
VA23B3420-001	BA2323-A-1	Aluminum	7429-90-5	E440	50	mg/kg	38200	35200	8.31%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	100	140	33.4%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	23.3	31.0	28.3%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	525	455	14.3%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.36	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	8.52	13.6	45.7%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	192	194	1.00%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.2	13.0	24.0%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	128000	134000	4.07%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	165	150	9.41%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	458	50.6	160%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	6600	1510	125%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	62400	55700	11.2%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	411	668	47.6%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	39.7	28.0	34.6%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	11100	10700	3.41%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	789	1090	32.4%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	25.0	64.0	87.7%	40%	DUP-H
		Nickel	7440-02-0	E440	0.50	mg/kg	125	174	32.8%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	8600	9440	9.23%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5620	5710	1.58%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.36	0.02	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.58	4.82	14.6%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	15000	14800	1.82%	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: 998647) - continued											
VA23B3420-001	BA2323-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	252	288	13.3%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12000	13800	13.7%	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	111	98.0	12.7%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	276	443	46.3%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	42.3	48.5	13.8%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.78	4.54	18.3%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	45.5	53.2	15.5%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4660	4930	5.65%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.5	0.2	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: 998650)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 998646)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 998647)						
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: 998647) - 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: 995540)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 995541)						
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: 998649)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 998650)									
Moisture	----	E144	0.25	%	50 %	99.9	90.0	110	----
Metals (QCLot: 998646)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	94.2	80.0	120	----
Metals (QCLot: 998647)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.4	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	94.8	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.8	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.3	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.4	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.4	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	88.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	96.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.6	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.5	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	92.9	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.2	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.2	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	98.8	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.1	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	89.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.1	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: 998647) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.3	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	90.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	90.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	91.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.9	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	90.0	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: 995540)										
VA23B3420-001	BA2323-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 995541)										
VA23B3420-001	BA2323-A-1	Antimony, TCLP	7440-36-0	E444	4.61 mg/L	5 mg/L	92.2	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.2	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.1 mg/L	12.5 mg/L	96.9	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.220 mg/L	0.25 mg/L	88.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.35 mg/L	10 mg/L	93.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.216 mg/L	0.25 mg/L	86.6	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.15 mg/L	1.25 mg/L	92.1	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	2.05 mg/L	2.5 mg/L	82.0	50.0	140	----
		Iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	91.9	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.94 mg/L	10 mg/L	89.4	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	244 mg/L	250 mg/L	97.5	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.21 mg/L	2.5 mg/L	88.3	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.66 mg/L	5 mg/L	93.2	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.101 mg/L	0.1 mg/L	101	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.6	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.48 mg/L	5 mg/L	89.5	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.1	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.4	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: 998646)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	95.8	70.0	130	----
Metals (QCLot: 998647)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	90.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	99.9	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.8	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	90.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	99.4	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	112	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	92.9	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	92.8	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	108	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	93.0	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.1	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	99.4	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	99.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	97.3	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	94.1	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	80.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----

Page : 11 of 11
 Work Order : VA23B3420
 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: 998647) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	100	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	92.6	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	84.6	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

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

Invoice To Same as Report ?		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)																																		
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:		<table border="1"> <tr> <td rowspan="4">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4">MOISTURE</td> <td rowspan="4">Chrome 6</td> <td rowspan="4">MET-CSR+FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="4">Number of Containers</td> </tr> <tr> <td colspan="6"></td> </tr> <tr> <td colspan="6"></td> </tr> <tr> <td colspan="6"></td> </tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers																		
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)																		Number of Containers																	
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																				
Contact:		LSD: (includes 2:1 pH)																																				
Address:		Quote #:																																				
Phone:		Fax:																																				
Lab/Work Order # (lab use only) B3420		ALS Contact:		Sampler:																																		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers
BA2323-A-1		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-2		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-3		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-4		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-5		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-6		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-7		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-8		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-9		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-10		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-11		07-Jun-23	9:00	Soil	X	X		X							1
BA2323-A-12		07-Jun-23	9:00	Soil	X	X		X							1

Environmental Division
Vancouver
Work Order Reference
VA23B3420



Telephone : + 1 604 263 4189

Special Instruct _____ (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:
<i>[Signature]</i>	13-June-23	0800				0C	RK	6/14	12:10pm	Yes / No ? If Yes add SIF

GENF 20.00 Front

18.6°C, 19°C