

Bottom Ash Data

2023 Week 18

The following analytical report represents bottom ash composite results for week 18 of 2023 (April 30, 2023 to May 6, 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 : VA23A9997</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 : 09-May-2023 12:45</p> <p>Date Analysis Commenced : 09-May-2023</p> <p>Issue Date : 16-May-2023 08:21</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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, 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)					BA2318-A1	BA2318-A2	BA2318-A3	BA2318-A4	BA2318-A5
Client sampling date / time					03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-001	VA23A9997-002	VA23A9997-003	VA23A9997-004	VA23A9997-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	21.8	22.3	23.5	22.8	23.6
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	11.9	11.9	11.8	11.8	12.0
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	46200	33700	56500	47100	43300
Antimony	7440-36-0	E440/VA	0.10	mg/kg	394	116	124	94.3	105
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	41.5	23.5	24.2	19.5	21.6
Barium	7440-39-3	E440/VA	0.50	mg/kg	551	471	544	523	352
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.39	0.37	0.42	0.38	0.37
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	17.9	24.0	28.0	12.2	15.2
Boron	7440-42-8	E440/VA	5.0	mg/kg	185	193	242	242	188
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.0	18.6	12.5	11.6	10.2
Calcium	7440-70-2	E440/VA	50	mg/kg	139000	134000	149000	137000	137000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	160	147	185	255	187
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	30.6	106	74.4	98.0	104
Copper	7440-50-8	E440/VA	0.50	mg/kg	6160	3090	2030	4290	3260
Iron	7439-89-6	E440/VA	50	mg/kg	52300	75200	54000	60000	54200
Lead	7439-92-1	E440/VA	0.50	mg/kg	10300	302	532	283	349
Lithium	7439-93-2	E440/VA	2.0	mg/kg	28.1	26.3	27.5	32.8	35.8
Magnesium	7439-95-4	E440/VA	20	mg/kg	13200	12100	12300	12000	12700
Manganese	7439-96-5	E440/VA	1.0	mg/kg	729	984	870	883	876
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	28.8	26.7	21.8	23.8	28.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg	116	134	129	185	316
Phosphorus	7723-14-0	E440/VA	50	mg/kg	10900	10200	12500	10100	11000
Potassium	7440-09-7	E440/VA	100	mg/kg	4790	5230	5610	5400	5110
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.45	0.42	0.46	0.55	0.46
Silver	7440-22-4	E440/VA	0.10	mg/kg	7.42	8.03	9.46	5.04	4.80
Sodium	7440-23-5	E440/VA	50	mg/kg	16600	16500	17900	16900	15900
Strontium	7440-24-6	E440/VA	0.50	mg/kg	456	271	283	278	251



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2318-A1	BA2318-A2	BA2318-A3	BA2318-A4	BA2318-A5
Client sampling date / time					03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-001	VA23A9997-002	VA23A9997-003	VA23A9997-004	VA23A9997-005
					Result	Result	Result	Result	Result
Metals									
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12000	12500	13800	11200	11900
Thallium	7440-28-0	E440/VA	0.050	mg/kg	0.094	<0.050	0.060	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	157	102	151	91.4	96.7
Titanium	7440-32-6	E440/VA	1.0	mg/kg	462	285	376	298	277
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	11.7	12.7	16.0	10.3	14.8
Uranium	7440-61-1	E440/VA	0.050	mg/kg	5.16	5.34	5.78	5.17	5.12
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	49.2	46.6	52.7	47.5	55.2
Zinc	7440-66-6	E440/VA	2.0	mg/kg	6250	4040	3960	3720	4190
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.7	2.9	4.3	6.4	2.7
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.9	12.0	11.9	11.9	11.9
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	10.1	9.90	9.56	9.98	9.71
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	6.11	6.12	6.08	6.27	5.88
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	2.34	2.28	2.29	2.24	2.42
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.167	0.187	0.156	0.150	0.296
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2150	2100	2090	2150	2110
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	0.917	2.72	0.988	1.02	2.32
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.68	1.22	0.934	0.686	1.18
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	130	127	128	133	136
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	0.65	0.67	0.54	0.58	0.57
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	BA2318-A1	BA2318-A2	BA2318-A3	BA2318-A4	BA2318-A5
					Client sampling date / time	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-001	VA23A9997-002	VA23A9997-003	VA23A9997-004	VA23A9997-005	
					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	34.8	41.5	35.9	27.7	33.9	
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L	<10	<10	<10	<10	<10	

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

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



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2318-A6	BA2318-A7	BA2318-A8	BA2318-A9	BA2318-A10
Client sampling date / time					03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-006	VA23A9997-007	VA23A9997-008	VA23A9997-009	VA23A9997-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	---	E144/VA	0.25	%	21.7	23.1	22.0	22.6	22.1
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.7	11.8	11.8	11.6	11.8
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	42800	40400	38700	46600	39400
Antimony	7440-36-0	E440/VA	0.10	mg/kg	118	102	123	107	111
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	22.1	21.2	21.2	22.2	25.0
Barium	7440-39-3	E440/VA	0.50	mg/kg	564	538	524	524	503
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.40	0.40	0.38	0.38	0.38
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	16.3	28.0	11.0	12.8	22.4
Boron	7440-42-8	E440/VA	5.0	mg/kg	235	288	148	185	192
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	9.38	17.6	11.8	9.47	9.54
Calcium	7440-70-2	E440/VA	50	mg/kg	139000	135000	130000	129000	132000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	277	133	137	151	149
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	75.3	38.1	73.3	75.5	327
Copper	7440-50-8	E440/VA	0.50	mg/kg	7600	2500	2130	1390	19000
Iron	7439-89-6	E440/VA	50	mg/kg	64400	50200	50700	43800	56400
Lead	7439-92-1	E440/VA	0.50	mg/kg	305	287	1220	893	353
Lithium	7439-93-2	E440/VA	2.0	mg/kg	23.8	25.2	23.4	25.7	30.2
Magnesium	7439-95-4	E440/VA	20	mg/kg	11800	11200	10600	11800	11100
Manganese	7439-96-5	E440/VA	1.0	mg/kg	2150	789	834	1130	990
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	26.8	21.1	23.5	24.2	21.0
Nickel	7440-02-0	E440/VA	0.50	mg/kg	288	128	101	118	178
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9660	10500	9700	10000	10400
Potassium	7440-09-7	E440/VA	100	mg/kg	5410	5140	4970	5560	4880
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.49	0.45	0.44	0.42	0.45
Silver	7440-22-4	E440/VA	0.10	mg/kg	7.59	5.36	19.8	5.16	6.73
Sodium	7440-23-5	E440/VA	50	mg/kg	16200	16400	15500	15600	16100
Strontium	7440-24-6	E440/VA	0.50	mg/kg	307	294	263	262	272
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12200	11600	11000	11600	11100



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2318-A6	BA2318-A7	BA2318-A8	BA2318-A9	BA2318-A10
Client sampling date / time					03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-006	VA23A9997-007	VA23A9997-008	VA23A9997-009	VA23A9997-010
					Result	Result	Result	Result	Result
Metals									
Thallium	7440-28-0	E440/VA	0.050	mg/kg	0.059	<0.050	<0.050	0.066	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	115	89.6	105	90.2	182
Titanium	7440-32-6	E440/VA	1.0	mg/kg	359	257	237	356	257
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	12.8	13.1	39.1	11.3	9.61
Uranium	7440-61-1	E440/VA	0.050	mg/kg	5.01	5.09	4.60	4.82	4.75
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	52.0	46.9	45.3	51.1	48.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3960	3580	3490	3010	4120
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.3	3.9	3.6	3.9	3.6
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.9	11.9	11.9	11.9	11.9
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	9.79	9.78	9.58	9.69	10.2
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	6.04	6.08	6.18	5.98	6.08
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	2.31	2.32	2.31	2.41	2.34
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.185	1.12	0.384	0.183	0.219
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2090	2120	2100	2080	2100
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	1.37	1.52	1.10	2.54	1.78
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.21	0.681	1.17	1.34	0.835
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	129	130	130	134	133
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	0.70	0.66	0.57	0.90	0.56
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	BA2318-A6	BA2318-A7	BA2318-A8	BA2318-A9	BA2318-A10
					Client sampling date / time	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00	03-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-006	VA23A9997-007	VA23A9997-008	VA23A9997-009	VA23A9997-010	
					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	47.4	37.1	28.9	47.1	29.3	
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)					BA2318-A11	BA2318-A12	----	----	----
Client sampling date / time					03-May-2023 09:00	03-May-2023 09:00	---	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-011	VA23A9997-012	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
Moisture	---	E144/VA	0.25	%	20.7	23.2	---	---	---
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.7	11.7	---	---	---
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	38700	35100	---	---	---
Antimony	7440-36-0	E440/VA	0.10	mg/kg	110	109	---	---	---
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.1	23.8	---	---	---
Barium	7440-39-3	E440/VA	0.50	mg/kg	534	410	---	---	---
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.37	0.38	---	---	---
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	31.6	30.2	---	---	---
Boron	7440-42-8	E440/VA	5.0	mg/kg	250	164	---	---	---
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.8	10.7	---	---	---
Calcium	7440-70-2	E440/VA	50	mg/kg	131000	136000	---	---	---
Chromium	7440-47-3	E440/VA	0.50	mg/kg	234	178	---	---	---
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	55.0	63.5	---	---	---
Copper	7440-50-8	E440/VA	0.50	mg/kg	5710	1940	---	---	---
Iron	7439-89-6	E440/VA	50	mg/kg	55200	49400	---	---	---
Lead	7439-92-1	E440/VA	0.50	mg/kg	492	319	---	---	---
Lithium	7439-93-2	E440/VA	2.0	mg/kg	31.6	24.3	---	---	---
Magnesium	7439-95-4	E440/VA	20	mg/kg	11800	12000	---	---	---
Manganese	7439-96-5	E440/VA	1.0	mg/kg	950	799	---	---	---
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	---	---	---
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	25.6	28.4	---	---	---
Nickel	7440-02-0	E440/VA	0.50	mg/kg	495	356	---	---	---
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9990	10400	---	---	---
Potassium	7440-09-7	E440/VA	100	mg/kg	5220	4660	---	---	---
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.45	0.47	---	---	---
Silver	7440-22-4	E440/VA	0.10	mg/kg	5.42	8.26	---	---	---
Sodium	7440-23-5	E440/VA	50	mg/kg	15900	15900	---	---	---
Strontium	7440-24-6	E440/VA	0.50	mg/kg	265	269	---	---	---
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11600	12400	---	---	---



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID		BA2318-A11	BA2318-A12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		03-May-2023 09:00	03-May-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-011	VA23A9997-012	-----	-----	-----	-----	-----
					Result	Result	----	----	----	----	----
Metals											
Thallium	7440-28-0	E440/VA	0.050	mg/kg	0.056	<0.050	----	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	104	118	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	208	209	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	10.1	15.0	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	5.03	5.12	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	51.1	48.5	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	12800	3640	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.9	4.0	----	----	----	----	----
TCLP Metals											
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.8	12.0	----	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	9.53	9.73	----	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.90	2.90	----	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.05	6.06	----	----	----	----	----
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	2.30	2.40	----	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.172	0.170	----	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2090	2130	----	----	----	----	----
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	2.52	2.55	----	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.07	0.937	----	----	----	----	----
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	144	136	----	----	----	----	----
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	0.59	0.77	----	----	----	----	----
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		BA2318-A11	BA2318-A12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		03-May-2023 09:00	03-May-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9997-011	VA23A9997-012	-----	-----	-----	-----	-----
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	32.4	33.3	---	---	---	---	---
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 : VA23A9997</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 : 09-May-2023 12:45</p> <p>Issue Date : 16-May-2023 08:21</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	VA23A9997-001	BA2318-A1	Antimony	7440-36-0	E440	114 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Arsenic	7440-38-2	E440	61.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Cobalt	7440-48-4	E440	39.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Copper	7440-50-8	E440	87.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Lead	7439-92-1	E440	190 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Nickel	7440-02-0	E440	41.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Silver	7440-22-4	E440	106 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Tin	7440-31-5	E440	51.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Titanium	7440-32-6	E440	41.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9997-001	BA2318-A1	Zinc	7440-66-6	E440	46.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group 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 BA2318-A1	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A10	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A11	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A12	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A2	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A3	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2318-A4	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2318-A5	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2318-A6	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2318-A7	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2318-A8	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2318-A9	E510	03-May-2023	15-May-2023	----	----		16-May-2023	28 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2318-A1	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2318-A10	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2318-A11	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2318-A12	E440	03-May-2023	15-May-2023	----	----		16-May-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		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A2	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A3	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A4	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A5	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A6	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A7	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A8	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2318-A9	E440	03-May-2023	15-May-2023	----	----		16-May-2023	180 days	13 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2318-A1	E144	03-May-2023	----	----	----		13-May-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 BA2318-A10	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A11	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A12	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A2	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A3	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A4	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A5	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A6	E144	03-May-2023	----	----	----		13-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2318-A7	E144	03-May-2023	----	----	----		13-May-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 BA2318-A8	E144	03-May-2023	----	----	----		13-May-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2318-A9	E144	03-May-2023	----	----	----		13-May-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A1	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A10	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A11	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A12	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A2	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A3	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A4	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A5	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A6	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A7	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A8	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2318-A9	E108	03-May-2023	15-May-2023	----	----		15-May-2023	30 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A1	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A10	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A11	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A12	E512	09-May-2023	11-May-2023	----	----		11-May-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) BA2318-A2	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A3	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A4	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A5	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A6	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A7	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A8	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2318-A9	E512	09-May-2023	11-May-2023	----	----		11-May-2023	28 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A1	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 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 : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A10	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A11	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A12	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A2	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A3	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A4	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A5	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A6	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2318-A7	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2318-A8	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2318-A9	E444	09-May-2023	11-May-2023	----	----		11-May-2023	180 days	8 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A1	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A10	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A11	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A12	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A2	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A3	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A4	EPP444	03-May-2023	09-May-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) BA2318-A5	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A6	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A7	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A8	EPP444	03-May-2023	09-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2318-A9	EPP444	03-May-2023	09-May-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	937136	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	937137	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	937139	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	937138	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	937136	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	937137	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	937139	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	937138	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	931266	1	13	7.6	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	937136	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	931267	1	13	7.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	937137	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	937139	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	931266	1	13	7.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	931267	1	13	7.6	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60°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°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Page : 16 of 16
 Work Order : VA23A9997
 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	: VA23A9997	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	: 09-May-2023 12:45
PO	: VANCO0000051998	Date Analysis Commenced	: 09-May-2023
C-O-C number	: ----	Issue Date	: 16-May-2023 08:21
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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, 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: 937138)											
VA23A9997-001	BA2318-A1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	11.9	0.3%	5%	----
Physical Tests (QC Lot: 937139)											
VA23A9997-001	BA2318-A1	Moisture	----	E144	0.25	%	21.8	23.0	5.55%	20%	----
Metals (QC Lot: 937136)											
VA23A9997-001	BA2318-A1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 937137)											
VA23A9997-001	BA2318-A1	Aluminum	7429-90-5	E440	50	mg/kg	46200	40000	14.3%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	394	108	114%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	41.5	22.0	61.3%	30%	DUP-H
		Barium	7440-39-3	E440	0.50	mg/kg	551	557	1.11%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	17.9	16.7	7.05%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	185	180	2.85%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.0	9.52	4.90%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	139000	130000	6.54%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	160	139	13.8%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	30.6	45.4	39.0%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	6160	2420	87.0%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	52300	57800	10.0%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	10300	276	190%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	28.1	25.4	10.4%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	13200	11900	10.6%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	729	692	5.21%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	28.8	24.4	16.6%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	116	177	41.4%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	10900	11200	2.56%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	4790	5230	8.67%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.48	0.03	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	7.42	24.0	106%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	16600	16200	2.53%	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: 937137) - continued											
VA23A9997-001	BA2318-A1	Strontium	7440-24-6	E440	0.50	mg/kg	456	336	30.1%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12000	12200	0.856%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.094	<0.050	0.044	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	157	92.7	51.6%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	462	303	41.5%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	11.7	15.3	26.5%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	5.16	5.07	1.68%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.2	50.7	2.94%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	6250	3920	46.0%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.7	2.8	0.1	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 937139)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 937136)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 937137)						
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: 937137) - 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: 931266)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 931267)						
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: 937138)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 937139)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 937136)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	113	80.0	120	----
Metals (QCLot: 937137)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	99.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	88.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.3	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.2	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.2	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.2	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	109	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.9	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	96.1	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	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: 937137) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.7	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	106	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	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: 931266)										
VA23A9996-001	Anonymous	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	92.1	50.0	140	----
TCLP Metals (QCLot: 931267)										
VA23A9996-001	Anonymous	Antimony, TCLP	7440-36-0	E444	5.09 mg/L	5 mg/L	102	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	96.0	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.5 mg/L	12.5 mg/L	100	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.223 mg/L	0.25 mg/L	89.0	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.40 mg/L	10 mg/L	94.0	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.232 mg/L	0.25 mg/L	92.6	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	92.2	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.231 mg/L	0.25 mg/L	92.3	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.24 mg/L	2.5 mg/L	89.8	50.0	140	----
		Iron, TCLP	7439-89-6	E444	228 mg/L	250 mg/L	91.3	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.22 mg/L	10 mg/L	92.2	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.2	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.26 mg/L	2.5 mg/L	90.3	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.96 mg/L	5 mg/L	99.2	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.100 mg/L	0.1 mg/L	99.6	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	91.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.64 mg/L	5 mg/L	92.9	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.2	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.46 mg/L	10 mg/L	94.6	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	91.7	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: 937136)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	108	70.0	130	----
Metals (QCLot: 937137)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	120	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	111	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	98.1	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	114	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	99.9	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	105	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	121	70.0	130	----

Page : 11 of 11
 Work Order : VA23A9997
 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: 937137) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	114	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.5	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	108	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 Skrypynyk	<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	Email 2:	ofetherstonhaugh@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypynyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
			brent.kirkpatrick@metrovancoouver.org		Analysis Request	
			Sarah.Wellman@metrovancoouver.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 #:									
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite								
Contact:		LSD:	(includes 2:1 pH)								
Address:		Quote #:									
Phone:											

Lab Work Order # (lab use only)	9997	ALS Contact:		Sampler:	
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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			
BA2318-A-1		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-2		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-3		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-4		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-5		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-6		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-7		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-8		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-9		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-10		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-11		03-May-23	9:00	Soil	X	X		X				1
BA2318-A-12		03-May-23	9:00	Soil	X	X		X				1

**Environmental Division
 Vancouver
 Work Order Reference
 VA23A9997**



Telephone : +1 604 263 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	9-May-23	<i>[Signature]</i>				19 °C	<i>[Signature]</i>	05/09/23	12:45 PM	