

Bottom Ash Data

2023 Week 19

The following analytical report represents bottom ash composite results for week 19 of 2023 (May 7, 2023 to May 13, 2023).

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



CERTIFICATE OF ANALYSIS

Work Order	: VA23B0716	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 BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 16-May-2023 12:15
PO	: VANCO0000051998	Date Analysis Commenced	: 17-May-2023
C-O-C number	: ----	Issue Date	: 25-May-2023 13:43
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Walt Kippenhuck	Supervisor - Inorganic	Metals, Waterloo, Ontario



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)					BA2319-A-1	BA2319-A-2	BA2319-A-3	BA2319-A-4	BA2319-A-5
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-001	VA23B0716-002	VA23B0716-003	VA23B0716-004	VA23B0716-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	21.8	19.7	21.1	21.6	22.0
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	11.5	11.4	11.4	11.4	11.4
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	45300	32300	45800	33200	37000
Antimony	7440-36-0	E440/VA	0.10	mg/kg	114	136	114	152	149
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	26.6	27.8	22.8	28.6	24.4
Barium	7440-39-3	E440/VA	0.50	mg/kg	756	386	551	433	565
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.41	0.41	0.38	0.41	0.37
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.16	18.3	15.1	13.8	10.0
Boron	7440-42-8	E440/VA	5.0	mg/kg	283	232	251	194	187
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	13.1	13.5	11.4	14.2	16.9
Calcium	7440-70-2	E440/VA	50	mg/kg	151000	166000	142000	166000	142000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	314	166	330	286	236
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	125	96.1	61.7	102	36.2
Copper	7440-50-8	E440/VA	0.50	mg/kg	5100	2940	14400	2870	1740
Iron	7439-89-6	E440/VA	50	mg/kg	59600	39400	71100	51000	75000
Lead	7439-92-1	E440/VA	0.50	mg/kg	400	556	618	2150	1360
Lithium	7439-93-2	E440/VA	2.0	mg/kg	34.1	33.3	28.5	34.1	24.1
Magnesium	7439-95-4	E440/VA	20	mg/kg	12800	12600	10600	12600	11200
Manganese	7439-96-5	E440/VA	1.0	mg/kg	1190	708	1410	860	944
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0634	0.213	<0.0500	0.0578	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	32.5	28.0	23.6	29.7	25.5
Nickel	7440-02-0	E440/VA	0.50	mg/kg	238	280	134	259	192
Phosphorus	7723-14-0	E440/VA	50	mg/kg	11900	13300	10700	13600	10200
Potassium	7440-09-7	E440/VA	100	mg/kg	6170	6840	6270	6180	5750
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.54	0.43	0.38	0.45	0.42
Silver	7440-22-4	E440/VA	0.10	mg/kg	10.8	10.6	7.53	6.24	5.07
Sodium	7440-23-5	E440/VA	50	mg/kg	18600	18600	16800	17100	16600
Strontium	7440-24-6	E440/VA	0.50	mg/kg	311	334	287	364	343



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2319-A-1	BA2319-A-2	BA2319-A-3	BA2319-A-4	BA2319-A-5
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-001	VA23B0716-002	VA23B0716-003	VA23B0716-004	VA23B0716-005
					Result	Result	Result	Result	Result
Metals									
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11700	13400	11900	13800	11600
Thallium	7440-28-0	E440/VA	0.050	mg/kg	0.063	0.054	<0.050	0.065	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	2420	144	117	134	114
Titanium	7440-32-6	E440/VA	1.0	mg/kg	267	216	424	232	276
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	13.4	16.7	22.0	20.8	14.7
Uranium	7440-61-1	E440/VA	0.050	mg/kg	4.72	5.77	4.79	5.89	4.64
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	49.3	53.2	49.3	53.0	50.2
Zinc	7440-66-6	E440/VA	2.0	mg/kg	6040	3990	3850	4510	6890
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.3	2.7	3.4	2.2	2.4
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532/WT	0.10	mg/kg	0.57	----	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.8	11.7	11.8	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.72	7.84	8.28	7.00	8.07
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.92	7.07	6.82	7.05	5.97
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	1.89	1.89	1.84	1.87	2.13
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.096	0.117	0.113	0.133	0.198
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2410	2410	2410	2440	2700
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	1.06	0.848	1.02	1.00	1.91
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.614	0.564	0.751	0.650	1.30
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	122	116	120	118	147
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2319-A-1	BA2319-A-2	BA2319-A-3	BA2319-A-4	BA2319-A-5
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-001	VA23B0716-002	VA23B0716-003	VA23B0716-004	VA23B0716-005
					Result	Result	Result	Result	Result
TCLP Metals									
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	0.32	0.31	0.39	0.32	0.69
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
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	5.54	3.73	11.2	4.38	78.7
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)

					BA2319-A-6	BA2319-A-7	BA2319-A-8	BA2319-A-9	BA2319-A-10
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-006	VA23B0716-007	VA23B0716-008	VA23B0716-009	VA23B0716-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	---	E144/VA	0.25	%	22.8	20.9	22.5	22.5	19.8
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.5	11.4	11.4	11.4	11.5
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	39000	41400	37500	32900	30600
Antimony	7440-36-0	E440/VA	0.10	mg/kg	102	130	123	103	106
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	24.3	26.1	22.9	20.9	23.4
Barium	7440-39-3	E440/VA	0.50	mg/kg	699	643	586	567	642
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.42	0.34	0.38	0.34	0.39
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	9.84	15.5	8.02	9.02	7.72
Boron	7440-42-8	E440/VA	5.0	mg/kg	189	186	156	214	149
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	14.0	11.0	9.87	11.0	10.5
Calcium	7440-70-2	E440/VA	50	mg/kg	140000	145000	148000	141000	152000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	177	205	246	214	211
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	118	77.8	57.4	739	56.4
Copper	7440-50-8	E440/VA	0.50	mg/kg	2640	2540	4270	4880	1880
Iron	7439-89-6	E440/VA	50	mg/kg	65700	69100	73300	59000	51300
Lead	7439-92-1	E440/VA	0.50	mg/kg	378	616	422	376	636
Lithium	7439-93-2	E440/VA	2.0	mg/kg	27.2	30.4	25.3	29.3	28.2
Magnesium	7439-95-4	E440/VA	20	mg/kg	11200	11100	12200	10900	11300
Manganese	7439-96-5	E440/VA	1.0	mg/kg	803	859	878	788	1010
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	23.0	27.7	29.9	25.0	26.1
Nickel	7440-02-0	E440/VA	0.50	mg/kg	190	168	461	256	147
Phosphorus	7723-14-0	E440/VA	50	mg/kg	11100	10900	9660	10800	9940
Potassium	7440-09-7	E440/VA	100	mg/kg	5830	5710	5690	5660	6010
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.35	0.36	0.33	0.35	0.39
Silver	7440-22-4	E440/VA	0.10	mg/kg	4.11	3.92	10.5	3.57	5.20
Sodium	7440-23-5	E440/VA	50	mg/kg	16100	16600	16000	16600	17400
Strontium	7440-24-6	E440/VA	0.50	mg/kg	285	294	277	316	301
Sulfur	7704-34-9	E440/VA	1000	mg/kg	10800	11700	10700	10500	10300



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2319-A-6	BA2319-A-7	BA2319-A-8	BA2319-A-9	BA2319-A-10
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-006	VA23B0716-007	VA23B0716-008	VA23B0716-009	VA23B0716-010
					Result	Result	Result	Result	Result
Metals									
Thallium	7440-28-0	E440/VA	0.050	mg/kg	0.050	<0.050	0.053	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	102	162	305	181	88.6
Titanium	7440-32-6	E440/VA	1.0	mg/kg	277	312	226	179	205
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	11.1	13.1	14.6	14.7	11.7
Uranium	7440-61-1	E440/VA	0.050	mg/kg	4.42	4.54	4.46	4.54	4.62
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	47.2	45.6	50.4	44.5	45.6
Zinc	7440-66-6	E440/VA	2.0	mg/kg	4120	3560	5150	6730	3130
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.6	2.6	3.2	3.6	3.1
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.7	11.8	11.7	11.8	11.7
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	8.30	8.52	8.21	8.25	6.93
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA	0.010	pH units	7.23	7.04	7.01	6.56	6.43
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	1.86	1.92	1.94	2.15	2.01
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.078	0.194	0.089	0.161	0.165
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2440	2360	2470	2710	2620
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	0.401	0.917	0.709	1.15	1.30
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.590	0.637	0.645	0.690	0.622
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	116	118	116	137	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	0.30	0.29	0.28	0.47	0.50
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	BA2319-A-6	BA2319-A-7	BA2319-A-8	BA2319-A-9	BA2319-A-10
					Client sampling date / time	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00	10-May-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-006	VA23B0716-007	VA23B0716-008	VA23B0716-009	VA23B0716-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	2.08	4.46	5.08	25.3	26.3	
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)					BA2319-A-11	BA2319-A-12	----	----	----
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-011	VA23B0716-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	18.4	20.2	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	11.6	11.4	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	33100	30800	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	123	124	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.0	23.8	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	453	623	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.33	0.39	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.46	8.67	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	148	164	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.1	13.1	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	148000	148000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	147	216	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	79.2	62.0	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	7420	2400	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	51700	60800	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	933	580	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	24.1	35.4	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10200	11200	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	655	994	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	78.7	28.6	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	298	194	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	10800	10700	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5640	6130	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.35	0.46	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	4.28	6.78	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	16000	17200	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	298	326	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11100	11300	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2319-A-11	BA2319-A-12	----	----	----
Client sampling date / time					10-May-2023 09:00	10-May-2023 09:00	---	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-011	VA23B0716-012	-----	-----	-----
					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	92.4	99.3	---	---	---
Titanium	7440-32-6	E440/VA	1.0	mg/kg	222	220	---	---	---
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	9.88	12.1	---	---	---
Uranium	7440-61-1	E440/VA	0.050	mg/kg	4.82	4.81	---	---	---
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	44.0	50.2	---	---	---
Zinc	7440-66-6	E440/VA	2.0	mg/kg	4750	3760	---	---	---
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.3	2.7	---	---	---
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.8	11.7	---	---	---
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	8.24	7.89	---	---	---
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.89	2.89	---	---	---
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.61	6.26	---	---	---
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	2.02	2.03	---	---	---
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.138	0.189	---	---	---
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2690	2600	---	---	---
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	1.33	1.90	---	---	---
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.718	0.909	---	---	---
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	134	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	0.46	0.54	---	---	---
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		BA2319-A-11	BA2319-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		10-May-2023 09:00	10-May-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0716-011	VA23B0716-012	-----	-----	-----	-----	-----
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	18.6	29.5	---	---	---	---	---
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 : VA23B0716</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 : 16-May-2023 12:15</p> <p>Issue Date : 25-May-2023 13:42</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	VA23B0716-001	BA2319-A-1	Antimony	7440-36-0	E440	30.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Barium	7440-39-3	E440	43.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Boron	7440-42-8	E440	36.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Chromium	7440-47-3	E440	55.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Cobalt	7440-48-4	E440	70.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Manganese	7439-96-5	E440	36.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Nickel	7440-02-0	E440	32.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Tin	7440-31-5	E440	176 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Tungsten	7440-33-7	E440	43.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B0716-001	BA2319-A-1	Zinc	7440-66-6	E440	44.2 % 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 BA2319-A-1	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-10	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-11	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-12	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-2	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-3	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2319-A-4	E510	10-May-2023	23-May-2023	----	----		24-May-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 BA2319-A-5	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2319-A-6	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2319-A-7	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2319-A-8	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2319-A-9	E510	10-May-2023	23-May-2023	----	----		24-May-2023	28 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2319-A-1	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2319-A-10	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2319-A-11	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2319-A-12	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 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 : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-2	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-3	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-4	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-5	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-6	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-7	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-8	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2319-A-9	E440	10-May-2023	23-May-2023	----	----		24-May-2023	180 days	14 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2319-A-1	E144	10-May-2023	----	----	----		21-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 BA2319-A-10	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-11	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-12	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-2	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-3	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-4	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-5	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-6	E144	10-May-2023	----	----	----		21-May-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2319-A-7	E144	10-May-2023	----	----	----		21-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 BA2319-A-8	E144	10-May-2023	----	----	----		21-May-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2319-A-9	E144	10-May-2023	----	----	----		21-May-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-1	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-10	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-11	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-12	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-2	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-3	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-4	E108	10-May-2023	24-May-2023	----	----		24-May-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 BA2319-A-5	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-6	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-7	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-8	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2319-A-9	E108	10-May-2023	24-May-2023	----	----		24-May-2023	30 days	14 days	✔	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC											
Glass soil jar/Teflon lined cap BA2319-A-1	E532	10-May-2023	20-May-2023	30 days	10 days	✔	24-May-2023	7 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-1	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-10	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-11	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-12	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-2	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-3	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-4	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-5	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-6	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-7	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-8	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2319-A-9	E512	17-May-2023	19-May-2023	----	----		19-May-2023	28 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-1	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-10	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-11	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-12	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-2	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-3	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-4	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-5	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-6	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-7	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-8	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2319-A-9	E444	17-May-2023	18-May-2023	----	----		19-May-2023	180 days	9 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-1	EPP444	10-May-2023	17-May-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-10	EPP444	10-May-2023	17-May-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-11	EPP444	10-May-2023	17-May-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-12	EPP444	10-May-2023	17-May-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-2	EPP444	10-May-2023	17-May-2023	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-3	EPP444	10-May-2023	17-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) BA2319-A-4	EPP444	10-May-2023	17-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-5	EPP444	10-May-2023	17-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-6	EPP444	10-May-2023	17-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-7	EPP444	10-May-2023	17-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-8	EPP444	10-May-2023	17-May-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2319-A-9	EPP444	10-May-2023	17-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)							
Hexavalent Chromium (Cr VI) by IC	E532	948460	1	10	10.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	948943	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	948944	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	948950	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	948945	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	948460	2	10	20.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	948943	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	948944	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	948950	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	948945	1	18	5.5	5.0	✔
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	948460	1	10	10.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	945223	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	948943	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	945224	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	948944	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	948950	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	945223	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	945224	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.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
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 HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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	: VA23B0716	Page	: 1 of 12
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	: 16-May-2023 12:15
PO	: VANCO0000051998	Date Analysis Commenced	: 17-May-2023
C-O-C number	: ----	Issue Date	: 25-May-2023 13:42
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
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario



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: 948945)											
VA23B0598-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	3.80	3.74	1.6%	5%	----
Physical Tests (QC Lot: 948950)											
VA23B0716-001	BA2319-A-1	Moisture	----	E144	0.25	%	21.8	20.2	7.71%	20%	----
Metals (QC Lot: 948943)											
VA23B0716-001	BA2319-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0634	<0.0500	0.0134	Diff <2x LOR	----
Metals (QC Lot: 948944)											
VA23B0716-001	BA2319-A-1	Aluminum	7429-90-5	E440	50	mg/kg	45300	36000	22.8%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	114	156	30.7%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	26.6	26.7	0.325%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	756	488	43.2%	40%	DUP-H
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.59	0.18	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	8.16	9.80	18.3%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	283	197	36.0%	30%	DUP-H
		Cadmium	7440-43-9	E440	0.020	mg/kg	13.1	11.5	12.6%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	151000	163000	7.82%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	314	177	55.9%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	125	260	70.3%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	5100	3950	25.6%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	59600	58900	1.16%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	400	438	9.04%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	34.1	35.0	2.52%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12800	12800	0.518%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1190	821	36.5%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	32.5	27.0	18.5%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	238	171	32.5%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	11900	14100	17.1%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	6170	6120	0.870%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.54	0.38	0.16	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	10.8	9.26	15.1%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	18600	17600	5.60%	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: 948944) - continued											
VA23B0716-001	BA2319-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	311	353	12.5%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11700	13300	12.6%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.063	0.052	0.011	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	2420	153	176%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	267	305	13.4%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	13.4	20.8	43.0%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	4.72	5.18	9.09%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.3	53.5	8.25%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	6040	3860	44.2%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	3.3	2.5	0.8	Diff <2x LOR	----
Speciated Metals (QC Lot: 948460)											
VA23B1094-001	Anonymous	Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.43	0.24	0.19	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: 948950)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 948943)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 948944)						
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: 948944) - 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	----
Speciated Metals (QCLot: 948460)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 945223)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 945224)						
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: 948945)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 948950)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 948943)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	113	80.0	120	----
Metals (QCLot: 948944)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.3	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	98.2	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	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	99.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	105	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	118	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	105	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.0	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	98.6	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: 948944) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.9	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	96.5	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	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	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.4	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
Speciated Metals (QCLot: 948460)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	96.4	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: 945223)										
VA23B0716-001	BA2319-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 945224)										
VA23B0716-001	BA2319-A-1	Antimony, TCLP	7440-36-0	E444	6.10 mg/L	5 mg/L	122	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.0	50.0	140	----
		Barium, TCLP	7440-39-3	E444	14.0 mg/L	12.5 mg/L	112	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.234 mg/L	0.25 mg/L	93.5	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.88 mg/L	10 mg/L	88.8	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.236 mg/L	0.25 mg/L	94.6	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	1.17 mg/L	1.25 mg/L	93.7	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	2.16 mg/L	2.5 mg/L	86.5	50.0	140	----
		Iron, TCLP	7439-89-6	E444	226 mg/L	250 mg/L	90.2	50.0	140	----
		Lead, TCLP	7439-92-1	E444	11.3 mg/L	10 mg/L	113	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	266 mg/L	250 mg/L	106	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.20 mg/L	2.5 mg/L	88.0	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.89 mg/L	5 mg/L	97.9	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.108 mg/L	0.1 mg/L	108	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.7 mg/L	5 mg/L	114	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.89 mg/L	5 mg/L	118	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	94.0	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.81 mg/L	10 mg/L	98.1	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.5	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: 948943)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	111	70.0	130	----
Metals (QCLot: 948944)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	117	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	101	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	108	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	114	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	95.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	109	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	106	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	108	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.3	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	107	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	112	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	113	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	107	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	105	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	100	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	88.8	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----



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: 948944) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	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	98.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	102	70.0	130	----
Speciated Metals (QCLot: 948460)									
	RM	Chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	95.1	70.0	130	----



Environmental Division
 Vancouver
 Work Order Reference
VA23B0716



Telephone : + 1 604 253 4188

Report To			Report Format / Distribution			Service Requested (Rush for routine)											
Company: Covanta Energy			<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) - 50% Surcharge											
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											
Address: 5150 Riverbend Drive Burnaby BC			Email 1: nvictor@covanta.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge											
Phone: 604-521-1025 Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No			Email 2: ofetherstonhaugh@covanta.com			<input type="radio"/> Same Day or Weekend Emergency - Contact /											
			Email 3: dskrypnik@covanta.com			Analysis R											
			brent.kirkpatrick@metrovancover.org														
			Sarah.Wellman@metrovancover.org														
Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)											
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:														
Company:			PO / AFE: PO# 46693 Weekly Bottom Ash - Suite														
Contact:			LSD: (includes 2:1 pH)														
Address:			Quote #:														
Phone: Fax:			ALS Contact:														
Lab Work Order # (lab use only)			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
BA2319-A-1			10-May-23	9:00	Soil	X	X	X	X							1	
BA2319-A-2			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-3			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-4			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-5			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-6			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-7			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-8			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-9			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-10			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-11			10-May-23	9:00	Soil	X	X		X							1	
BA2319-A-12			10-May-23	9:00	Soil	X	X		X							1	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																	
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																	
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																	
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																	
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)										
Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF							
<i>[Signature]</i>	16 May 23	0800	<i>[Signature]</i>	MAY 16 2023	12:15pm	22.52°C											
GENF 20.00 Front																	