

Bottom Ash Data

2023 Week 16

The following analytical report represents bottom ash composite results for week 16 of 2023 (April 16, 2023 to April 22, 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 : VA23A8838</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 : ----</p> <p>PO : 46693 Weekly Bottom Ash-Suite</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 : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 25-Apr-2023 14:34</p> <p>Date Analysis Commenced : 25-Apr-2023</p> <p>Issue Date : 01-May-2023 18:59</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
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-1	BA2316-A-2	BA2316-A-3	BA2316-A-4	BA2316-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-001	VA23A8838-002	VA23A8838-003	VA23A8838-004	VA23A8838-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	22.2	21.9	23.8	22.2	22.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.8	11.9	12.0	12.0	12.0	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	34800	30100	43200	37700	47800	
Antimony	7440-36-0	E440	0.10	mg/kg	166	145	193	190	165	
Arsenic	7440-38-2	E440	0.10	mg/kg	411	28.0	37.8	32.4	26.7	
Barium	7440-39-3	E440	0.50	mg/kg	514	483	564	580	593	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	0.45	0.40	0.41	
Bismuth	7440-69-9	E440	0.20	mg/kg	6.69	5.87	7.98	9.94	6.24	
Boron	7440-42-8	E440	5.0	mg/kg	167	167	213	181	149	
Cadmium	7440-43-9	E440	0.020	mg/kg	11.7	12.0	13.7	12.8	13.0	
Calcium	7440-70-2	E440	50	mg/kg	149000	147000	184000	164000	156000	
Chromium	7440-47-3	E440	0.50	mg/kg	249	192	290	227	200	
Cobalt	7440-48-4	E440	0.10	mg/kg	403	53.5	122	151	138	
Copper	7440-50-8	E440	0.50	mg/kg	9580	26000	4490	4010	21500	
Iron	7439-89-6	E440	50	mg/kg	79800	72100	81700	86200	66300	
Lead	7439-92-1	E440	0.50	mg/kg	438	691	429	467	379	
Lithium	7439-93-2	E440	2.0	mg/kg	28.2	22.0	34.3	29.3	25.6	
Magnesium	7439-95-4	E440	20	mg/kg	11100	10500	13700	13600	12200	
Manganese	7439-96-5	E440	1.0	mg/kg	1110	940	1200	1010	854	
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.0650	1.24	<0.0500	
Molybdenum	7439-98-7	E440	0.10	mg/kg	27.2	19.0	27.2	18.6	19.0	
Nickel	7440-02-0	E440	0.50	mg/kg	307	175	247	263	259	
Phosphorus	7723-14-0	E440	50	mg/kg	11000	11000	13200	12600	11100	
Potassium	7440-09-7	E440	100	mg/kg	5150	5110	6870	6170	5960	
Selenium	7782-49-2	E440	0.20	mg/kg	0.65	0.46	0.71	0.77	0.55	
Silver	7440-22-4	E440	0.10	mg/kg	6.25	9.20	9.20	7.23	6.23	
Sodium	7440-23-5	E440	50	mg/kg	14900	14500	18300	18000	16500	
Strontium	7440-24-6	E440	0.50	mg/kg	278	280	364	344	315	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-1	BA2316-A-2	BA2316-A-3	BA2316-A-4	BA2316-A-5
(Matrix: Soil/Solid)					Client sampling date / time	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-001	VA23A8838-002	VA23A8838-003	VA23A8838-004	VA23A8838-005	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	11600	11100	13700	12400	11600	
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0.065	0.056	0.060	
Tin	7440-31-5	E440	2.0	mg/kg	155	145	835	224	128	
Titanium	7440-32-6	E440	1.0	mg/kg	240	167	256	259	320	
Tungsten	7440-33-7	E440	0.50	mg/kg	12.6	9.77	12.3	18.0	12.6	
Uranium	7440-61-1	E440	0.050	mg/kg	4.87	5.03	6.12	5.44	5.21	
Vanadium	7440-62-2	E440	0.20	mg/kg	50.2	45.0	58.0	49.6	51.9	
Zinc	7440-66-6	E440	2.0	mg/kg	3810	4550	5500	4960	4980	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.5	2.5	3.4	2.3	3.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.9	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.07	6.20	6.28	6.05	7.01	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.19	6.05	6.17	6.39	7.08	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	2.28	2.27	2.29	2.36	2.10	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.172	0.171	0.183	0.129	0.068	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2310	2440	2340	2340	2160	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.36	1.40	1.48	1.52	0.732	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.694	0.709	0.329	0.645	0.408	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	151	164	164	153	129	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.62	0.76	0.82	0.70	0.38	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2316-A-1	BA2316-A-2	BA2316-A-3	BA2316-A-4	BA2316-A-5
Client sampling date / time					19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-001	VA23A8838-002	VA23A8838-003	VA23A8838-004	VA23A8838-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	36.7	37.3	48.4	27.2	2.82	2.82
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-6	BA2316-A-7	BA2316-A-8	BA2316-A-9	BA2316-A-10
(Matrix: Soil/Solid)					Client sampling date / time	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-006	VA23A8838-007	VA23A8838-008	VA23A8838-009	VA23A8838-010	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	23.1	23.2	22.8	23.7	23.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	11.9	11.9	11.9	11.9	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	41600	45000	49800	31800	57600	
Antimony	7440-36-0	E440	0.10	mg/kg	200	175	169	196	184	
Arsenic	7440-38-2	E440	0.10	mg/kg	30.9	28.8	27.2	33.0	30.5	
Barium	7440-39-3	E440	0.50	mg/kg	530	572	620	558	649	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	0.39	0.48	0.43	
Bismuth	7440-69-9	E440	0.20	mg/kg	7.49	7.01	6.44	9.35	10.0	
Boron	7440-42-8	E440	5.0	mg/kg	198	192	174	188	230	
Cadmium	7440-43-9	E440	0.020	mg/kg	15.1	14.5	13.5	19.0	47.0	
Calcium	7440-70-2	E440	50	mg/kg	167000	166000	161000	178000	181000	
Chromium	7440-47-3	E440	0.50	mg/kg	220	219	220	263	323	
Cobalt	7440-48-4	E440	0.10	mg/kg	324	70.5	206	203	1620	
Copper	7440-50-8	E440	0.50	mg/kg	5590	2930	10900	2080	9290	
Iron	7439-89-6	E440	50	mg/kg	67500	59300	65400	72200	77000	
Lead	7439-92-1	E440	0.50	mg/kg	2180	372	1350	11400	689	
Lithium	7439-93-2	E440	2.0	mg/kg	33.0	24.9	26.5	38.7	63.9	
Magnesium	7439-95-4	E440	20	mg/kg	12400	12100	12600	12700	13500	
Manganese	7439-96-5	E440	1.0	mg/kg	918	1780	891	1610	1680	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0510	<0.0500	<0.0500	0.0676	0.0551	
Molybdenum	7439-98-7	E440	0.10	mg/kg	19.8	21.7	23.8	26.0	21.6	
Nickel	7440-02-0	E440	0.50	mg/kg	272	176	360	219	339	
Phosphorus	7723-14-0	E440	50	mg/kg	13300	12600	10900	12600	12000	
Potassium	7440-09-7	E440	100	mg/kg	5580	6080	6050	5910	6610	
Selenium	7782-49-2	E440	0.20	mg/kg	0.70	0.51	0.52	0.61	0.50	
Silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	5.54	----	18.1	
Silver	7440-22-4	E440	0.10	mg/kg	6.78	7.05	----	6.74	----	
Sodium	7440-23-5	E440	50	mg/kg	16000	16500	16700	16600	18600	
Strontium	7440-24-6	E440	0.50	mg/kg	353	309	316	332	322	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-6	BA2316-A-7	BA2316-A-8	BA2316-A-9	BA2316-A-10
(Matrix: Soil/Solid)					Client sampling date / time	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-006	VA23A8838-007	VA23A8838-008	VA23A8838-009	VA23A8838-010	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	13800	12300	12400	14400	13400	
Thallium	7440-28-0	E440	0.050	mg/kg	0.178	0.056	0.068	0.066	0.070	
Tin	7440-31-5	E440	2.0	mg/kg	164	179	135	265	2320	
Titanium	7440-32-6	E440	1.0	mg/kg	280	267	318	185	330	
Tungsten	7440-33-7	E440	0.50	mg/kg	13.6	13.2	11.2	15.3	15.3	
Uranium	7440-61-1	E440	0.050	mg/kg	5.85	5.62	5.42	6.69	6.09	
Vanadium	7440-62-2	E440	0.20	mg/kg	56.3	50.1	50.9	54.7	57.7	
Zinc	7440-66-6	E440	2.0	mg/kg	18900	3980	7870	4600	6150	
Zirconium	7440-67-7	E440	1.0	mg/kg	1.7	2.1	2.5	2.4	4.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.86	5.72	5.29	6.84	6.25	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.92	6.84	6.97	7.04	6.82	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	2.00	1.99	1.96	2.04	1.99	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.077	0.090	0.313	0.074	0.084	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2090	2110	2090	2110	2110	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.773	0.856	1.67	0.803	0.716	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.392	0.407	0.390	0.330	0.455	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	129	126	126	129	128	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.43	0.45	0.62	0.41	0.51	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2316-A-6	BA2316-A-7	BA2316-A-8	BA2316-A-9	BA2316-A-10
Client sampling date / time					19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00	19-Apr-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-006	VA23A8838-007	VA23A8838-008	VA23A8838-009	VA23A8838-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	4.40	8.00	3.87	4.02	7.16	7.16
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-11	BA2316-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	19-Apr-2023 09:00	19-Apr-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-011	VA23A8838-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
Moisture	----	E144	0.25	%	23.2	24.5	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.0	12.0	----	----	----	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	47500	39900	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	147	168	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	25.6	27.4	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	594	569	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.38	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	5.69	8.05	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	172	172	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	10.9	12.1	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	155000	150000	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	229	351	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	132	505	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	3840	4070	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	72200	85000	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	291	307	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	25.8	46.6	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	11600	11600	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	1120	1370	----	----	----	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0574	0.0520	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	23.7	19.3	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	257	958	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	9400	10600	----	----	----	
Potassium	7440-09-7	E440	100	mg/kg	5610	5660	----	----	----	
Selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.44	----	----	----	
Silver	7440-22-4	E440.Ag	0.10	mg/kg	----	7.80	----	----	----	
Silver	7440-22-4	E440	0.10	mg/kg	6.50	----	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	19300	16500	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	291	767	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2316-A-11	BA2316-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	19-Apr-2023 09:00	19-Apr-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-011	VA23A8838-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	10300	11200	---	---	---	
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.052	---	---	---	
Tin	7440-31-5	E440	2.0	mg/kg	147	133	---	---	---	
Titanium	7440-32-6	E440	1.0	mg/kg	323	313	---	---	---	
Tungsten	7440-33-7	E440	0.50	mg/kg	10.8	278	---	---	---	
Uranium	7440-61-1	E440	0.050	mg/kg	4.92	5.32	---	---	---	
Vanadium	7440-62-2	E440	0.20	mg/kg	49.1	47.5	---	---	---	
Zinc	7440-66-6	E440	2.0	mg/kg	7270	5980	---	---	---	
Zirconium	7440-67-7	E440	1.0	mg/kg	3.1	2.4	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.97	6.23	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	7.15	6.85	---	---	---	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	---	---	---	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	---	---	---	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	---	---	---	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	2.11	2.06	---	---	---	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.249	0.082	---	---	---	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2080	---	---	---	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.532	0.858	---	---	---	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.372	0.457	---	---	---	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	130	128	---	---	---	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.46	0.51	---	---	---	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	---	---	---	



Analytical Results

Sub-Matrix: Soil					Client sample ID		BA2316-A-11	BA2316-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		19-Apr-2023 09:00	19-Apr-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A8838-011	VA23A8838-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	---	---	---	---	---
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	---	---
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	---	---
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	---	---	---	---	---
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	1.86	7.60	---	---	---	---	---
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	---	---	---	---	---

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



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA23A8838</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 : ----</p> <p>PO : 46693 Weekly Bottom Ash-Suite</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 25-Apr-2023 14:34</p> <p>Issue Date : 01-May-2023 18:59</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	VA23A8838-001	BA2316-A-1	Arsenic	7440-38-2	E440	172 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Cobalt	7440-48-4	E440	63.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Copper	7440-50-8	E440	127 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Lead	7439-92-1	E440	123 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Nickel	7440-02-0	E440	30.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Silver	7440-22-4	E440	83.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A8838-001	BA2316-A-1	Tungsten	7440-33-7	E440	49.9 % 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 : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2316-A-12	E440.Ag	19-Apr-2023	29-Apr-2023	180 days	10 days	✓	30-Apr-2023	170 days	1 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2316-A-8	E440.Ag	19-Apr-2023	29-Apr-2023	180 days	10 days	✓	30-Apr-2023	170 days	1 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2316-A-10	E440.Ag	19-Apr-2023	01-May-2023	180 days	12 days	✓	01-May-2023	168 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2316-A-1	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2316-A-10	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2316-A-11	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2316-A-12	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-2	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-3	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-4	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-5	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-6	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-7	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-8	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2316-A-9	E510	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	28 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2316-A-1	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-10	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-11	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-12	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-2	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-3	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-4	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-5	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-6	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2316-A-7	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 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 ICPMS											
LDPE bag BA2316-A-8	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2316-A-9	E440	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	180 days	10 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-1	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-10	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-11	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-12	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-2	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-3	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2316-A-4	E144	19-Apr-2023	----	----	----		26-Apr-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 BA2316-A-5	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2316-A-6	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2316-A-7	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2316-A-8	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2316-A-9	E144	19-Apr-2023	----	----	----		26-Apr-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2316-A-1	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2316-A-10	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2316-A-11	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2316-A-12	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-2	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-3	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-4	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-5	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-6	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-7	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-8	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2316-A-9	E108	19-Apr-2023	28-Apr-2023	----	----		28-Apr-2023	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-1	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-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) BA2316-A-10	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-11	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-12	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-2	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-3	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-4	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-5	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-6	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-7	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-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) BA2316-A-8	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2316-A-9	E512	25-Apr-2023	27-Apr-2023	----	----		27-Apr-2023	28 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-1	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-10	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-11	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-12	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-2	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-3	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2316-A-4	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-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) BA2316-A-5	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2316-A-6	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2316-A-7	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2316-A-8	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2316-A-9	E444	25-Apr-2023	26-Apr-2023	----	----		27-Apr-2023	180 days	8 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-1	EPP444	19-Apr-2023	25-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-10	EPP444	19-Apr-2023	25-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-11	EPP444	19-Apr-2023	25-Apr-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-12	EPP444	19-Apr-2023	25-Apr-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: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-2	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-3	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-4	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-5	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-6	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-7	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-8	EPP444	19-Apr-2023	25-Apr-2023	---	---		---	---	---	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2316-A-9	EPP444	19-Apr-2023	25-Apr-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	912241	1	13	7.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	912242	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	912244	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	912243	1	13	7.6	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	917210	2	3	66.6	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	912241	2	13	15.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	912242	2	13	15.3	10.0	✔
Moisture Content by Gravimetry	E144	912244	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	912243	1	13	7.6	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	917210	2	3	66.6	5.0	✔
Mercury by CVAAS (TCLP)	E512	912334	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	912241	1	13	7.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	912335	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	912242	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	912244	1	13	7.6	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	912334	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	912335	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 ± 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are 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. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. 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



<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 HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag 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	: VA23A8838	Page	: 1 of 12
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: ----	Date Samples Received	: 25-Apr-2023 14:34
PO	: 46693 Weekly Bottom Ash-Suite	Date Analysis Commenced	: 25-Apr-2023
C-O-C number	: ----	Issue Date	: 01-May-2023 18:59
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
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 12
Work Order : VA23A8838
Client : Covanta Burnaby Renewable Energy, ULC
Project : ----



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: 912243)											
VA23A8838-001	BA2316-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.8	11.9	0.7%	5%	----
Physical Tests (QC Lot: 912244)											
VA23A8838-001	BA2316-A-1	Moisture	----	E144	0.25	%	22.2	23.2	4.35%	20%	----
Metals (QC Lot: 912241)											
VA23A8838-001	BA2316-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0557	0.0057	Diff <2x LOR	----
Metals (QC Lot: 912242)											
VA23A8838-001	BA2316-A-1	Aluminum	7429-90-5	E440	50	mg/kg	34800	48000	31.9%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	166	175	4.95%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	411	30.5	172%	30%	DUP-H
		Barium	7440-39-3	E440	0.50	mg/kg	514	688	28.9%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.40	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	6.69	7.55	12.0%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	167	206	21.1%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	11.7	15.2	25.9%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	149000	168000	11.6%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	249	203	20.6%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	403	209	63.2%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	9580	2120	127%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	79800	79500	0.298%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	438	1850	123%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	28.2	37.4	28.0%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11100	13600	20.0%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1110	1060	4.79%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	27.2	19.3	33.8%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	307	226	30.5%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	11000	13600	21.5%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5150	6490	23.0%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.65	0.49	0.16	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	6.25	15.2	83.3%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	14900	17800	18.2%	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: 912242) - continued											
VA23A8838-001	BA2316-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	278	332	17.5%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11600	12700	8.52%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.064	0.014	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	155	181	15.7%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	240	326	30.1%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	12.6	20.9	49.9%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	4.87	5.67	15.2%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	50.2	55.6	10.2%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3810	3860	1.39%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.5	2.2	0.2	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

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

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 912244)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 912241)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 912242)						
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: 912242) - 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	---
Metals (QCLot: 916073)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	---
Metals (QCLot: 917210)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	---
TCLP Metals (QCLot: 912334)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 912335)						
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	---

Page : 7 of 12
Work Order : VA23A8838
Client : Covanta Burnaby Renewable Energy, ULC
Project : ---





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: 912243)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 912244)									
Moisture	---	E144	0.25	%	50 %	99.9	90.0	110	---
Metals (QCLot: 912241)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.6	80.0	120	---
Metals (QCLot: 912242)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	---
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	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	105	80.0	120	---
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	---
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	86.2	80.0	120	---
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.5	80.0	120	---
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	---
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.2	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	101	80.0	120	---
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	---
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.1	80.0	120	---
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	---
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	---
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	---
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	---
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	---
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	113	80.0	120	---
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	98.6	80.0	120	---
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	106	80.0	120	---
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	---
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.5	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: 912242) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	98.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.5	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.2	80.0	120	----
Metals (QCLot: 916073)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	103	80.0	120	----
Metals (QCLot: 917210)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	87.8	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: 912334)										
VA23A8838-001	BA2316-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.3	50.0	140	----
TCLP Metals (QCLot: 912335)										
VA23A8838-001	BA2316-A-1	Antimony, TCLP	7440-36-0	E444	5.75 mg/L	5 mg/L	115	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	105	50.0	140	----
		Barium, TCLP	7440-39-3	E444	14.1 mg/L	12.5 mg/L	113	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.262 mg/L	0.25 mg/L	105	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.9 mg/L	10 mg/L	109	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.268 mg/L	0.25 mg/L	107	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.28 mg/L	1.25 mg/L	102	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	2.50 mg/L	2.5 mg/L	99.9	50.0	140	----
		Iron, TCLP	7439-89-6	E444	256 mg/L	250 mg/L	102	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	293 mg/L	250 mg/L	117	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.52 mg/L	2.5 mg/L	101	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.11 mg/L	5 mg/L	102	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.113 mg/L	0.1 mg/L	113	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.1 mg/L	5 mg/L	101	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.18 mg/L	5 mg/L	104	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.82 mg/L	0.75 mg/L	109	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	103	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: 912241)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
Metals (QCLot: 912242)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	109	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.1	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	99.7	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	109	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	103	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	97.0	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	98.3	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.4	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	97.0	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	96.3	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.4	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	91.3	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	98.5	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	97.8	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	92.7	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	90.1	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	113	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: 912242) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	97.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.9	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	93.6	70.0	130	----



Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)					
Company: Covanta Energy			<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Nicole Victor / Dan Skrypnik			<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 5150 Riverbend Drive Burnaby BC			Email 1: nvictor@covanta.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
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 ALS to Confirm TAT					
			Email 3: dskrypnik@covanta.com			Analysis Request					
			brent.kirkpatrick@metrovancover.org								
			Sarah.Wellman@metrovancover.org								

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

Lab Work Order # (lab use only)			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					
BA2316-A-1		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-2		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-3		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-4		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-5		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-6		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-7		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-8		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-9		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-10		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-11		19-Apr-23	9:00	Soil	X	X		X						1
BA2316-A-12		19-Apr-23	9:00	Soil	X	X		X						1

Environmental Division
 Vancouver
 Work Order Reference
VA23A8838

 Telephone : +1 604 253 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	25 APR 23	0800		APR 25 2022	1125am	21 °C				