

Bottom Ash Data

2023 Week 3

The following analytical report represents bottom ash composite results for week 3 of 2023 (January 15, 2023 to January 21, 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 : VA23A1737</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO0000051998</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 11</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 24-Jan-2023 12:40</p> <p>Date Analysis Commenced : 28-Jan-2023</p> <p>Issue Date : 02-Feb-2023 15:52</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Qualifiers

<i>Qualifier</i>	<i>Description</i>
RRV	Reported result verified by repeat analysis.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2303-A-1	BA2303-A-2	BA2303-A-3	BA2303-A-4	BA2303-A-5
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-001	VA23A1737-002	VA23A1737-003	VA23A1737-004	VA23A1737-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	23.4	18.4	21.6	20.4	22.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	9.97	10.7	10.8	10.6	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	33600	47000	40100	36200	42200	
Antimony	7440-36-0	E440	0.10	mg/kg	115	107	112	102	110	
Arsenic	7440-38-2	E440	0.10	mg/kg	24.9	19.3	21.1	20.7	22.2	
Barium	7440-39-3	E440	0.50	mg/kg	523	493	516	542	518	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.59	0.39	0.34	0.42	0.43	
Bismuth	7440-69-9	E440	0.20	mg/kg	12.2	9.17	10.2	10.4	12.0	
Boron	7440-42-8	E440	5.0	mg/kg	254	199	164	190	174	
Cadmium	7440-43-9	E440	0.020	mg/kg	14.7	9.37	7.66	7.73	44.1	
Calcium	7440-70-2	E440	50	mg/kg	133000	128000	125000	126000	137000	
Chromium	7440-47-3	E440	0.50	mg/kg	147	183	155	187	163	
Cobalt	7440-48-4	E440	0.10	mg/kg	171	49.8	37.8	58.1	206	
Copper	7440-50-8	E440	0.50	mg/kg	1920	1790	5870	4620	2260	
Iron	7439-89-6	E440	50	mg/kg	55000	61500	80300	53200	64000	
Lead	7439-92-1	E440	0.50	mg/kg	342	302	1800	311	405	
Lithium	7439-93-2	E440	2.0	mg/kg	37.4	23.3	21.7	21.3	24.3	
Magnesium	7439-95-4	E440	20	mg/kg	11000	11000	11800	12000	11000	
Manganese	7439-96-5	E440	1.0	mg/kg	783	846	835	809	9510	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0503	0.0568	0.0660	<0.0500	0.0702	
Molybdenum	7439-98-7	E440	0.10	mg/kg	34.2	22.0	22.3	27.2	24.0	
Nickel	7440-02-0	E440	0.50	mg/kg	170	123	268	179	250	
Phosphorus	7723-14-0	E440	50	mg/kg	10700	11100	9230	11800	10800	
Potassium	7440-09-7	E440	100	mg/kg	5900	7060	5450	5690	6110	
Selenium	7782-49-2	E440	0.20	mg/kg	0.55	0.42	0.36	0.35	0.44	
Silver	7440-22-4	E440	0.10	mg/kg	5.50	7.29	7.01	5.52	7.98	
Sodium	7440-23-5	E440	50	mg/kg	18100	19700	17800	16300	17400	
Strontium	7440-24-6	E440	0.50	mg/kg	342	283	294	284	278	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2303-A-1	BA2303-A-2	BA2303-A-3	BA2303-A-4	BA2303-A-5
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-001	VA23A1737-002	VA23A1737-003	VA23A1737-004	VA23A1737-005	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	12000	12000	10200	10500	12100	
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
Tin	7440-31-5	E440	2.0	mg/kg	100	112	115	121	114	
Titanium	7440-32-6	E440	1.0	mg/kg	371	656	446	258	306	
Tungsten	7440-33-7	E440	0.50	mg/kg	16.9	51.4	34.6	32.9	28.3	
Uranium	7440-61-1	E440	0.050	mg/kg	3.45	2.64	2.77	2.92	3.24	
Vanadium	7440-62-2	E440	0.20	mg/kg	39.0	41.5	41.7	39.0	38.9	
Zinc	7440-66-6	E440	2.0	mg/kg	2880	3710	3210	3470	4080	
Zirconium	7440-67-7	E440	1.0	mg/kg	1.2	2.7	2.0	2.2	2.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	10.6	11.4	11.1	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.20	7.58	8.33	7.96	9.31	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.55	6.38	6.40	6.42	6.27	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.89	2.16	2.14	1.87	2.01	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.102	0.114	0.106	0.102	0.146	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2020	2040	2090	1910	2060	
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	1.26	1.16	1.07	0.965	1.83	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.907	1.09	1.26	0.912	1.27	
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	120	109	112	117	120	
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	0.54	0.51	0.45	0.41	0.60	
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	BA2303-A-1	BA2303-A-2	BA2303-A-3	BA2303-A-4	BA2303-A-5
Client sampling date / time					18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-001	VA23A1737-002	VA23A1737-003	VA23A1737-004	VA23A1737-005	
					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	25.6	21.3	21.2	27.2	29.8	
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	BA2303-A-6	BA2303-A-7	BA2303-A-8	BA2303-A-9	BA2303-A-10
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-006	VA23A1737-007	VA23A1737-008	VA23A1737-009	VA23A1737-010	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	21.9	21.9	21.9	22.0	22.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.9	10.8	10.4	10.6	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	36400	37100	36300	35600	32500	
Antimony	7440-36-0	E440	0.10	mg/kg	124	119	137	108	140	
Arsenic	7440-38-2	E440	0.10	mg/kg	23.4	22.6	25.7	21.2	40.8	
Barium	7440-39-3	E440	0.50	mg/kg	571	560	503	434	471	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.42	0.43	0.38	0.38	
Bismuth	7440-69-9	E440	0.20	mg/kg	12.4	12.0	16.4	10.1	16.4	
Boron	7440-42-8	E440	5.0	mg/kg	189	163	177	223	161	
Cadmium	7440-43-9	E440	0.020	mg/kg	11.9	11.3	12.9	9.11	18.1	
Calcium	7440-70-2	E440	50	mg/kg	137000	148000	144000	130000	133000	
Chromium	7440-47-3	E440	0.50	mg/kg	194	183	220	256	232	
Cobalt	7440-48-4	E440	0.10	mg/kg	126	97.3	562	86.7	229	
Copper	7440-50-8	E440	0.50	mg/kg	3670	1480	4540	1920	40400 ^{RV}	
Iron	7439-89-6	E440	50	mg/kg	77000	83700	67900	53700	58500	
Lead	7439-92-1	E440	0.50	mg/kg	1690	316	459	1210	722	
Lithium	7439-93-2	E440	2.0	mg/kg	25.2	23.9	27.4	28.8	29.6	
Magnesium	7439-95-4	E440	20	mg/kg	11800	12600	12100	11100	10400	
Manganese	7439-96-5	E440	1.0	mg/kg	998	1060	3640	889	732	
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0702	0.0696	0.0681	0.0660	
Molybdenum	7439-98-7	E440	0.10	mg/kg	126	25.8	24.9	22.1	24.4	
Nickel	7440-02-0	E440	0.50	mg/kg	139	226	1170	166	264	
Phosphorus	7723-14-0	E440	50	mg/kg	10700	10500	12100	10300	10500	
Potassium	7440-09-7	E440	100	mg/kg	6620	5760	6270	6000	6420	
Selenium	7782-49-2	E440	0.20	mg/kg	0.47	0.44	0.50	0.40	0.49	
Silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	----	----	7.30	
Silver	7440-22-4	E440	0.10	mg/kg	5.72	6.14	7.77	6.32	----	
Sodium	7440-23-5	E440	50	mg/kg	18000	16600	17000	17000	16700	
Strontium	7440-24-6	E440	0.50	mg/kg	330	297	310	290	264	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2303-A-6	BA2303-A-7	BA2303-A-8	BA2303-A-9	BA2303-A-10
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-006	VA23A1737-007	VA23A1737-008	VA23A1737-009	VA23A1737-010	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	12300	12800	14500	12500	13300	
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0.054	0.053	0.052	
Tin	7440-31-5	E440	2.0	mg/kg	118	116	145	101	198	
Titanium	7440-32-6	E440	1.0	mg/kg	350	394	383	287	364	
Tungsten	7440-33-7	E440	0.50	mg/kg	24.8	29.8	42.6	35.9	18.4	
Uranium	7440-61-1	E440	0.050	mg/kg	3.34	3.62	3.79	3.09	3.56	
Vanadium	7440-62-2	E440	0.20	mg/kg	42.6	44.9	43.1	38.4	38.6	
Zinc	7440-66-6	E440	2.0	mg/kg	4980	5020	4910	3890	18600	
Zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.6	1.5	2.1	1.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.5	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.28	8.96	9.60	9.02	9.52	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.43	6.45	6.25	6.37	6.42	
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	2.03	1.91	1.88	1.90	1.96	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.106	0.102	0.165	0.112	0.161	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1980	1980	1910	1990	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	0.829	0.792	0.940	1.54	1.12	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	1.51	1.04	1.17	1.22	1.15	
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	117	125	118	116	124	
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	0.61	0.39	0.58	0.48	0.52	
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	BA2303-A-6	BA2303-A-7	BA2303-A-8	BA2303-A-9	BA2303-A-10
Client sampling date / time					18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	18-Jan-2023 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-006	VA23A1737-007	VA23A1737-008	VA23A1737-009	VA23A1737-010	
					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	
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	25.5	23.0	35.6	31.2	30.2	
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2303-A-11	BA2303-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-011	VA23A1737-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
Moisture	----	E144	0.25	%	21.7	21.3	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.5	----	----	----	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	41700	38400	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	127	121	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	22.7	19.4	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	419	515	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.32	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	15.9	10.2	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	176	237	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	9.34	8.52	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	138000	131000	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	216	170	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	62.6	195	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	4100	92200 ^{RV}	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	85300	69300	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	485	2530	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	24.7	21.3	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	11100	10500	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	1080	816	----	----	----	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0846	<0.0500	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	25.7	21.6	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	251	163	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	11300	11700	----	----	----	
Potassium	7440-09-7	E440	100	mg/kg	6040	5030	----	----	----	
Selenium	7782-49-2	E440	0.20	mg/kg	0.56	0.48	----	----	----	
Silver	7440-22-4	E440	0.10	mg/kg	14.3	7.74	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	16700	15100	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	280	282	----	----	----	
Sulfur	7704-34-9	E440	1000	mg/kg	13100	12300	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2303-A-11	BA2303-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	18-Jan-2023 09:00	18-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-011	VA23A1737-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.052	---	---	---	
Tin	7440-31-5	E440	2.0	mg/kg	191	130	---	---	---	
Titanium	7440-32-6	E440	1.0	mg/kg	351	388	---	---	---	
Tungsten	7440-33-7	E440	0.50	mg/kg	36.0	44.4	---	---	---	
Uranium	7440-61-1	E440	0.050	mg/kg	3.04	2.87	---	---	---	
Vanadium	7440-62-2	E440	0.20	mg/kg	38.5	45.2	---	---	---	
Zinc	7440-66-6	E440	2.0	mg/kg	4870	3590	---	---	---	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.3	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.98	8.50	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.44	6.40	---	---	---	
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	2.12	2.03	---	---	---	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.327	0.117	---	---	---	
Calcium, TCLP	7440-70-2	E444	10	mg/L	2110	2000	---	---	---	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.13	1.26	---	---	---	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	1.03	1.53	---	---	---	
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	120	117	---	---	---	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.50	0.55	---	---	---	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	---	---	---	
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	---	---	---	



Analytical Results

Sub-Matrix: Soil					Client sample ID		BA2303-A-11	BA2303-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		18-Jan-2023 09:00	18-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1737-011	VA23A1737-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
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	29.9	79.4	---	---	---	---	---
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 : VA23A1737</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO0000051998</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 24-Jan-2023 12:40</p> <p>Issue Date : 02-Feb-2023 15:52</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	VA23A1737-001	BA2303-A-1	Cadmium	7440-43-9	E440	58.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A1737-001	BA2303-A-1	Cobalt	7440-48-4	E440	143 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A1737-001	BA2303-A-1	Iron	7439-89-6	E440	37.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A1737-001	BA2303-A-1	Lithium	7439-93-2	E440	56.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2303-A-10	E440.Ag	18-Jan-2023	01-Feb-2023	180 days	14 days	✓	02-Feb-2023	166 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-1	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-10	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-11	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-12	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-2	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-3	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-4	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-5	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-6	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-7	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-8	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2303-A-9	E510	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	28 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2303-A-1	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2303-A-10	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2303-A-11	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-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 ICMS											
LDPE bag BA2303-A-12	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-2	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-3	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-4	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-5	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-6	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-7	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-8	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2303-A-9	E440	18-Jan-2023	31-Jan-2023	----	----		31-Jan-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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-1	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-10	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-11	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-12	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-2	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-3	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-4	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-5	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2303-A-6	E144	18-Jan-2023	----	----	----		28-Jan-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 BA2303-A-7	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2303-A-8	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2303-A-9	E144	18-Jan-2023	----	----	----		28-Jan-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-1	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-10	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-11	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-12	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-2	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-3	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-4	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-5	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-6	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-7	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-8	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2303-A-9	E108	18-Jan-2023	31-Jan-2023	----	----		31-Jan-2023	30 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-1	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-10	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-11	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-12	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-2	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-3	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-4	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-5	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-6	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-7	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-8	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2303-A-9	E512	31-Jan-2023	01-Feb-2023	----	----		01-Feb-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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-1	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-10	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-11	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-12	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-2	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-3	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-4	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-5	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-6	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-7	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-8	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2303-A-9	E444	31-Jan-2023	01-Feb-2023	----	----		01-Feb-2023	180 days	14 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-1	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-10	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-11	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-12	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-2	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-3	EPP444	18-Jan-2023	31-Jan-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) BA2303-A-4	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-5	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-6	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-7	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-8	EPP444	18-Jan-2023	31-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2303-A-9	EPP444	18-Jan-2023	31-Jan-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	817367	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	817366	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	817369	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	817368	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	821227	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	817367	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	817366	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	817369	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	817368	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	821227	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	821019	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	817367	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	821020	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	817366	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	817369	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	821019	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	821020	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 HNO3 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 HNO3 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	: VA23A1737	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	: Weekly Bottom Ash - Suite	Date Samples Received	: 24-Jan-2023 12:40
PO	: VANCO0000051998	Date Analysis Commenced	: 28-Jan-2023
C-O-C number	: ----	Issue Date	: 02-Feb-2023 15:52
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
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 817368)											
VA23A1737-001	BA2303-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.8	0.7%	5%	----
Physical Tests (QC Lot: 817369)											
VA23A1737-001	BA2303-A-1	Moisture	----	E144	0.25	%	23.4	23.4	0.177%	20%	----
Metals (QC Lot: 817366)											
VA23A1737-001	BA2303-A-1	Aluminum	7429-90-5	E440	50	mg/kg	33600	31000	8.16%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	115	110	4.11%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	24.9	22.1	12.2%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	523	562	7.16%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.59	0.43	0.16	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	12.2	11.0	9.45%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	254	204	21.9%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	14.7	8.05	58.5%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	133000	126000	5.12%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	147	165	11.4%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	171	28.3	143%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1920	1570	20.2%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	55000	80400	37.5%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	342	299	13.5%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	37.4	21.0	56.0%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	11000	11600	5.74%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	783	960	20.2%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	34.2	26.1	26.8%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	170	162	4.96%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	10700	10100	5.50%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5900	6270	6.13%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.55	0.35	0.19	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.50	4.13	28.3%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	18100	17100	5.35%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	342	281	19.3%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12000	9900	19.1%	30%	----



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: 817366) - continued											
VA23A1737-001	BA2303-A-1	Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	100	92.4	8.11%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	371	315	16.5%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	16.9	14.7	13.9%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.45	3.67	6.33%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	39.0	39.0	0.0368%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	2880	3350	15.3%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.3	0.2	Diff <2x LOR	----
Metals (QC Lot: 817367)											
VA23A1737-001	BA2303-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0503	<0.0500	0.0003	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: 817369)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 817366)						
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	---
Titanium	7440-32-6	E440	1	mg/kg	<1.0	---
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	---



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 817366) - continued						
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: 817367)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 821227)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 821019)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 821020)						
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: 817368)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 817369)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 817366)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.0	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	100	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.0	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	96.4	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	81.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	92.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.5	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.0	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	97.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	84.0	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.7	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	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	83.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	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	92.3	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	94.8	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	92.7	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: 817366) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.1	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	93.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.9	80.0	120	----
Metals (QCLot: 817367)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.7	80.0	120	----
Metals (QCLot: 821227)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	94.0	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Soil/Solid

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 821019)										
VA23A1737-001	BA2303-A-1	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.5	50.0	140	----
TCLP Metals (QCLot: 821020)										
VA23A1737-001	BA2303-A-1	Antimony, TCLP	7440-36-0	E444	5.14 mg/L	5 mg/L	103	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	12.6 mg/L	12.5 mg/L	100	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.218 mg/L	0.25 mg/L	87.4	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.28 mg/L	10 mg/L	92.8	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.240 mg/L	0.25 mg/L	96.0	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	1.19 mg/L	1.25 mg/L	95.4	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	2.24 mg/L	2.5 mg/L	89.5	50.0	140	----
		Iron, TCLP	7439-89-6	E444	231 mg/L	250 mg/L	92.5	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.78 mg/L	10 mg/L	97.8	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	251 mg/L	250 mg/L	100	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.29 mg/L	2.5 mg/L	91.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.87 mg/L	5 mg/L	97.3	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.105 mg/L	0.1 mg/L	105	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	99.8	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.88 mg/L	5 mg/L	97.6	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.72 mg/L	0.75 mg/L	95.5	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	92.3	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: 817366)									
	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	93.4	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.8	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	93.1	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	103	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	94.3	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	98.6	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	102	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	95.2	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	89.3	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	96.6	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	106	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	92.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	111	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	93.8	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	89.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	111	70.0	130	----
	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	105	70.0	130	----

Page : 12 of 12
 Work Order : VA23A1737
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 817366) - continued									
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.4	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.7	70.0	130	----
Metals (QCLot: 817367)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	96.2	70.0	130	----



Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Nicole Victor / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	nvictor@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
			brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

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

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
BA2303-A-1		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-2		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-3		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-4		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-5		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-6		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-7		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-8		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-9		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-10		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-11		18-Jan-23	9:00	Soil	X	X		X	1
BA2303-A-12		18-Jan-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23A1737



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
<i>[Signature]</i>	24-Jan-23	0800	<i>[Signature]</i>	24/1/23	1240 PM	15 °C				