

Bottom Ash Data

2023 Week 5

The following analytical report represents bottom ash composite results for week 5 of 2023 (January 29, 2023 to February 4, 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 : VA23A2890</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 : 07-Feb-2023 13:45</p> <p>Date Analysis Commenced : 09-Feb-2023</p> <p>Issue Date : 15-Feb-2023 10:02</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>
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, 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	BA2305-A-1	BA2305-A-2	BA2305-A-3	BA2305-A-4	BA2305-A-5
(Matrix: Soil/Solid)					Client sampling date / time	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-001	VA23A2890-002	VA23A2890-003	VA23A2890-004	VA23A2890-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	23.0	23.6	22.2	22.1	22.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.3	12.3	12.3	12.3	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	32600	31600	47500	69300	34600	
Antimony	7440-36-0	E440	0.10	mg/kg	145	190	135	165	172	
Arsenic	7440-38-2	E440	0.10	mg/kg	19.5	18.8	16.2	26.2	20.9	
Barium	7440-39-3	E440	0.50	mg/kg	522	493	614	654	650	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.36	0.42	0.39	0.44	
Bismuth	7440-69-9	E440	0.20	mg/kg	15.5	17.0	12.9	14.8	16.4	
Boron	7440-42-8	E440	5.0	mg/kg	207	175	179	172	164	
Cadmium	7440-43-9	E440	0.020	mg/kg	10.6	9.72	8.35	10.5	12.3	
Calcium	7440-70-2	E440	50	mg/kg	157000	153000	161000	158000	159000	
Chromium	7440-47-3	E440	0.50	mg/kg	183	372	160	187	221	
Cobalt	7440-48-4	E440	0.10	mg/kg	180	88.8	61.7	93.9	63.2	
Copper	7440-50-8	E440	0.50	mg/kg	5910	4340	1840	2700	3970	
Iron	7439-89-6	E440	50	mg/kg	69500	60200	75500	54000	82400	
Lead	7439-92-1	E440	0.50	mg/kg	1180	453	356	580	577	
Lithium	7439-93-2	E440	2.0	mg/kg	30.7	26.6	22.6	31.4	23.4	
Magnesium	7439-95-4	E440	20	mg/kg	11100	11100	10500	11700	12500	
Manganese	7439-96-5	E440	1.0	mg/kg	1600	1120	1260	1090	1080	
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	0.0502	
Molybdenum	7439-98-7	E440	0.10	mg/kg	19.0	23.7	24.2	23.7	19.8	
Nickel	7440-02-0	E440	0.50	mg/kg	182	360	141	242	162	
Phosphorus	7723-14-0	E440	50	mg/kg	10900	12400	11200	12000	12800	
Potassium	7440-09-7	E440	100	mg/kg	4120	4160	3820	3890	4200	
Selenium	7782-49-2	E440	0.20	mg/kg	0.49	0.43	0.41	0.46	0.54	
Silver	7440-22-4	E440	0.10	mg/kg	6.47	7.20	6.67	6.91	7.34	
Sodium	7440-23-5	E440	50	mg/kg	12800	13100	14400	12200	13200	
Strontium	7440-24-6	E440	0.50	mg/kg	319	323	309	303	320	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2305-A-1	BA2305-A-2	BA2305-A-3	BA2305-A-4	BA2305-A-5
(Matrix: Soil/Solid)					Client sampling date / time	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-001	VA23A2890-002	VA23A2890-003	VA23A2890-004	VA23A2890-005	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg	11100	9800	9800	10100	11800	
Thallium	7440-28-0	E440	0.050	mg/kg	0.075	<0.050	<0.050	0.051	0.058	
Tin	7440-31-5	E440	2.0	mg/kg	160	152	131	244	217	
Titanium	7440-32-6	E440	1.0	mg/kg	421	315	513	1170	424	
Tungsten	7440-33-7	E440	0.50	mg/kg	18.2	21.8	30.5	17.0	24.0	
Uranium	7440-61-1	E440	0.050	mg/kg	4.34	4.48	4.05	4.34	4.78	
Vanadium	7440-62-2	E440	0.20	mg/kg	45.7	46.6	49.8	49.1	48.1	
Zinc	7440-66-6	E440	2.0	mg/kg	4140	5090	3950	4430	4310	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.1	2.4	3.5	7.6	2.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	11.8	11.8	12.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.04	8.07	8.38	10.2	8.90	
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	7.47	7.03	6.85	7.33	7.31	
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	1.70	1.75	1.80	1.70	1.68	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	<0.050	0.079	0.082	<0.050	0.062	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1990	2010	1960	1930	1840	
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	0.577	0.804	0.686	0.461	0.393	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.373	0.687	0.567	0.485	0.530	
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	119	120	122	114	114	
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	0.29	0.36	0.38	0.32	0.27	
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	BA2305-A-1	BA2305-A-2	BA2305-A-3	BA2305-A-4	BA2305-A-5
Client sampling date / time					01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-001	VA23A2890-002	VA23A2890-003	VA23A2890-004	VA23A2890-005	
					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	1.52	12.2	10.7	2.46	1.89	
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	BA2305-A-6	BA2305-A-7	BA2305-A-8	BA2305-A-9	BA2305-A-10
(Matrix: Soil/Solid)					Client sampling date / time	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-006	VA23A2890-007	VA23A2890-008	VA23A2890-009	VA23A2890-010	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	22.6	23.8	22.0	22.4	23.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.3	12.3	12.3	12.3	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	39600	42900	44800	57500	27900	
Antimony	7440-36-0	E440	0.10	mg/kg	151	132	161	156	162	
Arsenic	7440-38-2	E440	0.10	mg/kg	18.3	18.0	20.1	17.0	20.0	
Barium	7440-39-3	E440	0.50	mg/kg	677	755	748	670	553	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.37	0.38	0.45	0.40	
Bismuth	7440-69-9	E440	0.20	mg/kg	12.8	17.0	13.4	11.5	13.6	
Boron	7440-42-8	E440	5.0	mg/kg	145	171	166	146	191	
Cadmium	7440-43-9	E440	0.020	mg/kg	9.59	10.8	10.9	12.1	16.5	
Calcium	7440-70-2	E440	50	mg/kg	151000	151000	162000	151000	164000	
Chromium	7440-47-3	E440	0.50	mg/kg	616	164	195	209	158	
Cobalt	7440-48-4	E440	0.10	mg/kg	90.8	394	236	276	47.4	
Copper	7440-50-8	E440	0.50	mg/kg	2270	3450	2170	4000	3040	
Iron	7439-89-6	E440	50	mg/kg	75000	72900	58200	52300	70900	
Lead	7439-92-1	E440	0.50	mg/kg	376	356	430	381	462	
Lithium	7439-93-2	E440	2.0	mg/kg	39.7	26.4	26.8	114	21.9	
Magnesium	7439-95-4	E440	20	mg/kg	11000	11300	13300	10800	11400	
Manganese	7439-96-5	E440	1.0	mg/kg	1160	2510	970	1070	979	
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
Molybdenum	7439-98-7	E440	0.10	mg/kg	19.7	18.2	20.9	18.3	18.0	
Nickel	7440-02-0	E440	0.50	mg/kg	202	194	140	312	113	
Phosphorus	7723-14-0	E440	50	mg/kg	11000	10300	12700	11000	14300	
Potassium	7440-09-7	E440	100	mg/kg	3910	3920	4100	4650	3940	
Selenium	7782-49-2	E440	0.20	mg/kg	0.42	0.32	0.56	0.37	0.44	
Silver	7440-22-4	E440	0.10	mg/kg	5.71	6.79	7.81	7.74	5.94	
Sodium	7440-23-5	E440	50	mg/kg	13400	12600	13400	13700	13000	
Strontium	7440-24-6	E440	0.50	mg/kg	307	336	341	297	356	
Sulfur	7704-34-9	E440	1000	mg/kg	9600	9000	10600	9300	10700	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2305-A-6	BA2305-A-7	BA2305-A-8	BA2305-A-9	BA2305-A-10
Client sampling date / time					01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-006	VA23A2890-007	VA23A2890-008	VA23A2890-009	VA23A2890-010	
					Result	Result	Result	Result	Result	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.054	0.069	0.081	0.076	
Tin	7440-31-5	E440	2.0	mg/kg	146	145	136	133	255	
Titanium	7440-32-6	E440	1.0	mg/kg	461	616	932	773	306	
Tungsten	7440-33-7	E440	0.50	mg/kg	20.3	19.2	28.1	22.6	26.6	
Uranium	7440-61-1	E440	0.050	mg/kg	4.13	4.06	4.40	4.03	4.58	
Vanadium	7440-62-2	E440	0.20	mg/kg	45.9	46.0	46.4	46.0	46.8	
Zinc	7440-66-6	E440	2.0	mg/kg	3770	4820	7030	5050	7530	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.6	2.6	2.7	4.4	2.9	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	12.0	11.9	12.0	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.07	9.82	8.37	9.61	10.3	
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	7.26	7.41	7.51	7.43	7.36	
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	1.66	1.70	1.73	1.63	1.81	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.056	0.061	<0.050	<0.050	<0.050	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1880	1920	1910	1880	1900	
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	0.579	0.544	0.295	0.693	0.630	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.554	0.502	0.512	0.463	0.489	
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	111	115	111	115	
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	0.33	0.28	<0.25	<0.25	0.35	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2305-A-6	BA2305-A-7	BA2305-A-8	BA2305-A-9	BA2305-A-10
Client sampling date / time					01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00	01-Feb-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-006	VA23A2890-007	VA23A2890-008	VA23A2890-009	VA23A2890-010	
TCLP Metals					Result	Result	Result	Result	Result	
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	2.97	2.16	0.98	1.72	1.91	
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	BA2305-A-11	BA2305-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	01-Feb-2023 09:00	01-Feb-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-011	VA23A2890-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
Moisture	----	E144	0.25	%	22.0	22.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.3	----	----	----	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	34300	33900	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	152	139	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	18.9	18.1	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	590	604	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.37	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	16.4	12.7	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	151	198	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	11.1	10.1	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	164000	145000	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	189	174	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	154	28.8	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	3320	2250	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	51800	70300	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	1690	1530	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	28.1	20.8	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	12000	10200	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	926	875	----	----	----	
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	19.1	22.1	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	177	222	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	15900	12800	----	----	----	
Potassium	7440-09-7	E440	100	mg/kg	4310	4060	----	----	----	
Selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.40	----	----	----	
Silver	7440-22-4	E440	0.10	mg/kg	5.78	6.32	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	13800	12800	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	340	308	----	----	----	
Sulfur	7704-34-9	E440	1000	mg/kg	10100	9400	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2305-A-11	BA2305-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	01-Feb-2023 09:00	01-Feb-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-011	VA23A2890-012	-----	-----	-----	
					Result	Result	----	----	----	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.056	----	----	----	
Tin	7440-31-5	E440	2.0	mg/kg	125	122	----	----	----	
Titanium	7440-32-6	E440	1.0	mg/kg	320	332	----	----	----	
Tungsten	7440-33-7	E440	0.50	mg/kg	24.7	20.9	----	----	----	
Uranium	7440-61-1	E440	0.050	mg/kg	4.53	3.84	----	----	----	
Vanadium	7440-62-2	E440	0.20	mg/kg	44.5	43.0	----	----	----	
Zinc	7440-66-6	E440	2.0	mg/kg	3980	3330	----	----	----	
Zirconium	7440-67-7	E440	1.0	mg/kg	3.1	3.6	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.54	9.23	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	7.15	7.49	----	----	----	
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	1.58	1.66	----	----	----	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.052	0.074	----	----	----	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1860	1910	----	----	----	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.564	0.576	----	----	----	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.550	0.510	----	----	----	
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	114	119	----	----	----	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.30	<0.25	----	----	----	
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		BA2305-A-11	BA2305-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		01-Feb-2023 09:00	01-Feb-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A2890-011	VA23A2890-012	-----	-----	-----	-----	-----
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	4.05	1.07	---	---	---	---	---
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 : VA23A2890</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 : 07-Feb-2023 13:45</p> <p>Issue Date : 15-Feb-2023 10:03</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	VA23A2890-001	BA2305-A-1	Cobalt	7440-48-4	E440	142 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A2890-001	BA2305-A-1	Copper	7440-50-8	E440	37.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A2890-001	BA2305-A-1	Titanium	7440-32-6	E440	55.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A2890-001	BA2305-A-1	Zinc	7440-66-6	E440	123 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-1	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-10	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-11	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-12	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-2	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-3	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2305-A-4	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 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 : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2305-A-5	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2305-A-6	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2305-A-7	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2305-A-8	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2305-A-9	E510	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	28 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-1	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-10	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-11	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-12	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-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 BA2305-A-2	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-3	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-4	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-5	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-6	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-7	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-8	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2305-A-9	E440	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	180 days	10 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2305-A-1	E144	01-Feb-2023	----	----	----		09-Feb-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 BA2305-A-10	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-11	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-12	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-2	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-3	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-4	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-5	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-6	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2305-A-7	E144	01-Feb-2023	----	----	----		09-Feb-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 BA2305-A-8	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2305-A-9	E144	01-Feb-2023	----	----	----		09-Feb-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-1	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-10	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-11	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-12	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-2	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-3	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-4	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-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 BA2305-A-5	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-6	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-7	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-8	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2305-A-9	E108	01-Feb-2023	09-Feb-2023	----	----		10-Feb-2023	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-1	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-10	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-11	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-12	E512	09-Feb-2023	15-Feb-2023	----	----		15-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) BA2305-A-2	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-3	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-4	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-5	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-6	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-7	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-8	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2305-A-9	E512	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	28 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-1	E444	09-Feb-2023	15-Feb-2023	----	----		15-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) BA2305-A-10	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-11	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-12	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-2	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-3	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-4	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-5	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-6	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2305-A-7	E444	09-Feb-2023	15-Feb-2023	----	----		15-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) BA2305-A-8	E444	09-Feb-2023	15-Feb-2023	----	----		15-Feb-2023	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2305-A-9	E444	09-Feb-2023	15-Feb-2023	----	----		15-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) BA2305-A-1	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-10	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-11	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-12	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-2	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-3	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-4	EPP444	01-Feb-2023	09-Feb-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) BA2305-A-5	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-6	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-7	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-8	EPP444	01-Feb-2023	09-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2305-A-9	EPP444	01-Feb-2023	09-Feb-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	829697	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	829698	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	829730	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	829700	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	829697	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	829698	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	829730	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	829700	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	834543	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	829697	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	834544	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	829698	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	829730	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	834543	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	834544	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: VA23A2890	Page	: 1 of 11
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	: 07-Feb-2023 13:45
PO	: VANCO0000051998	Date Analysis Commenced	: 09-Feb-2023
C-O-C number	: ----	Issue Date	: 15-Feb-2023 10:02
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>
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: 829700)											
VA23A2890-001	BA2305-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.3	12.4	0.2%	5%	----
Physical Tests (QC Lot: 829730)											
VA23A2890-001	BA2305-A-1	Moisture	----	E144	0.25	%	23.0	21.6	6.18%	20%	----
Metals (QC Lot: 829697)											
VA23A2890-001	BA2305-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 829698)											
VA23A2890-001	BA2305-A-1	Aluminum	7429-90-5	E440	50	mg/kg	32600	43000	27.6%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	145	130	10.6%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	19.5	18.5	4.88%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	522	738	34.2%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.37	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	15.5	11.8	26.9%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	207	195	6.08%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.6	9.40	12.3%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	157000	140000	11.3%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	183	210	13.7%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	180	30.6	142%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	5910	8590	37.0%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	69500	77300	10.6%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	1180	852	32.6%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	30.7	29.3	4.53%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11100	9170	19.3%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1600	1270	23.0%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	19.0	21.2	11.0%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	182	201	9.86%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	10900	11800	7.96%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	4120	3560	14.5%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.49	0.36	0.13	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	6.47	6.16	4.77%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	12800	12100	5.79%	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: 829698) - continued											
VA23A2890-001	BA2305-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	319	399	22.4%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11100	8300	28.9%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.086	0.011	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	160	135	16.8%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	421	743	55.3%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	18.2	19.0	3.94%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	4.34	3.65	17.4%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	45.7	43.1	5.83%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4140	17400	123%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.1	3.4	1.3	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: 829730)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 829697)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 829698)						
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: 829698) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 834543)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 834544)						
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: 829700)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 829730)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 829697)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
Metals (QCLot: 829698)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.4	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.3	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	95.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.2	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	95.2	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.1	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.4	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	98.6	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.8	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	96.5	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.1	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	89.2	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	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	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: 829698) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	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	91.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.1	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	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	94.6	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: 834543)										
VA23A2890-001	BA2305-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.7	50.0	140	----
TCLP Metals (QCLot: 834544)										
VA23A2890-001	BA2305-A-1	Antimony, TCLP	7440-36-0	E444	4.06 mg/L	5 mg/L	81.3	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.2 mg/L	5 mg/L	84.4	50.0	140	----
		Barium, TCLP	7440-39-3	E444	10.4 mg/L	12.5 mg/L	83.4	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.212 mg/L	0.25 mg/L	84.8	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.34 mg/L	10 mg/L	83.4	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.210 mg/L	0.25 mg/L	83.8	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	1.05 mg/L	1.25 mg/L	84.3	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	1.97 mg/L	2.5 mg/L	78.9	50.0	140	----
		Iron, TCLP	7439-89-6	E444	205 mg/L	250 mg/L	82.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.11 mg/L	10 mg/L	81.1	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	207 mg/L	250 mg/L	82.9	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.00 mg/L	2.5 mg/L	80.2	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.30 mg/L	5 mg/L	86.0	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.088 mg/L	0.1 mg/L	88.5	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.0 mg/L	5 mg/L	80.1	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.27 mg/L	5 mg/L	85.4	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.65 mg/L	0.75 mg/L	86.3	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	7.95 mg/L	10 mg/L	79.5	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	7 mg/L	10 mg/L	70.5	50.0	150	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 829697)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----
Metals (QCLot: 829698)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	99.3	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	96.8	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	102	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	97.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	103	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	96.5	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	96.6	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	97.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	101	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	102	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	97.5	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	104	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	111	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	96.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	91.0	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	91.6	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	104	70.0	130	----

Page : 11 of 11
 Work Order : VA23A2890
 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: 829698) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	100	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	100	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.9	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company: Covanta Energy		<input type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: Nicole Victor / Dan Skrypnik		<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Address: 5150 Riverbend Drive 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		Email 2: rjohnson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No		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" style="width: 100%; height: 100%;"> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-TCLP-VA (all metals, Hg)</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">MOISTURE</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">Chrome 6</td> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-CSR+FULL-VA (all metals)</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</td> </tr> <tr><td colspan="11"></td></tr> <tr><td colspan="11"></td></tr> <tr><td colspan="11"></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:																																																					

Lab Work Order # (lab use only)		2890		ALS Contact:		Sampler:					
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)			
	BA2305-A-1	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-2	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-3	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-4	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-5	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-6	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-7	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-8	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-9	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-10	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-11	01-Feb-23	9:00	Soil	X	X		X			1
	BA2305-A-12	01-Feb-23	9:00	Soil	X	X		X			1

Environmental Division
Vancouver
Work Order Reference
VA23A2890



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>	7 Feb 23	0800	CW	Feb 7	1345	15 °C				