

## Bottom Ash Data

2023 Week 11

---

The following analytical report represents bottom ash composite results for week 11 of 2023 (March 12, 2023 to March 18, 2023).

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



## CERTIFICATE OF ANALYSIS

<b>Work Order</b>	: <b>VA23A6191</b>	<b>Page</b>	: 1 of 11
<b>Client</b>	: <b>Covanta Burnaby Renewable Energy, ULC</b>	<b>Laboratory</b>	: Vancouver - Environmental
<b>Contact</b>	: Nicole Victor	<b>Account Manager</b>	: Brent Mack
<b>Address</b>	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	<b>Address</b>	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
<b>Telephone</b>	: ----	<b>Telephone</b>	: 778-370-3279
<b>Project</b>	: Weekly Bottom Ash - Suite	<b>Date Samples Received</b>	: 22-Mar-2023 14:06
<b>PO</b>	: VANCO0000051998	<b>Date Analysis Commenced</b>	: 23-Mar-2023
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 27-Mar-2023 15:46
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: Standing Offer (BC work)		
<b>No. of samples received</b>	: 12		
<b>No. of samples analysed</b>	: 12		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	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	BA2311-A-1	BA2311-A-2	BA2311-A-3	BA2311-A-4	BA2311-A-5
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-001	VA23A6191-002	VA23A6191-003	VA23A6191-004	VA23A6191-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
Moisture	----	E144	0.25	%	24.3	23.2	24.2	25.4	24.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.9	10.9	10.8	10.7	
<b>Metals</b>										
Aluminum	7429-90-5	E440	50	mg/kg	33400	30600	31500	36300	44200	
Antimony	7440-36-0	E440	0.10	mg/kg	170	167	182	151	190	
Arsenic	7440-38-2	E440	0.10	mg/kg	24.0	27.0	23.8	20.3	25.1	
Barium	7440-39-3	E440	0.50	mg/kg	472	456	492	401	436	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.37	0.42	0.35	0.37	
Bismuth	7440-69-9	E440	0.20	mg/kg	9.16	10.7	9.21	9.18	10.6	
Boron	7440-42-8	E440	5.0	mg/kg	215	242	270	200	190	
Cadmium	7440-43-9	E440	0.020	mg/kg	17.2	13.9	13.2	16.1	12.0	
Calcium	7440-70-2	E440	50	mg/kg	146000	153000	161000	147000	162000	
Chromium	7440-47-3	E440	0.50	mg/kg	141	173	169	170	189	
Cobalt	7440-48-4	E440	0.10	mg/kg	77.0	75.9	51.9	42.4	112	
Copper	7440-50-8	E440	0.50	mg/kg	6030	3260	1080	2850	1510	
Iron	7439-89-6	E440	50	mg/kg	44800	59300	46100	49400	42600	
Lead	7439-92-1	E440	0.50	mg/kg	303	336	392	377	588	
Lithium	7439-93-2	E440	2.0	mg/kg	25.8	29.4	26.1	30.0	33.1	
Magnesium	7439-95-4	E440	20	mg/kg	11400	10800	13200	12000	12600	
Manganese	7439-96-5	E440	1.0	mg/kg	703	861	623	688	699	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.122	0.122	0.115	0.0962	0.111	
Molybdenum	7439-98-7	E440	0.10	mg/kg	18.6	23.3	22.7	17.5	19.9	
Nickel	7440-02-0	E440	0.50	mg/kg	142	443	109	126	104	
Phosphorus	7723-14-0	E440	50	mg/kg	12200	11200	12700	10500	12700	
Potassium	7440-09-7	E440	100	mg/kg	5800	5830	6070	5530	6520	
Selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.47	0.42	0.38	0.40	
Silver	7440-22-4	E440	0.10	mg/kg	5.18	11.1	5.62	5.79	5.60	
Sodium	7440-23-5	E440	50	mg/kg	16400	16200	16400	15400	18000	
Strontium	7440-24-6	E440	0.50	mg/kg	286	322	446	314	323	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2311-A-1	BA2311-A-2	BA2311-A-3	BA2311-A-4	BA2311-A-5
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-001	VA23A6191-002	VA23A6191-003	VA23A6191-004	VA23A6191-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
Sulfur	7704-34-9	E440	1000	mg/kg	13000	14600	14500	12600	16100	
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	132	163	128	134	138	
Titanium	7440-32-6	E440	1.0	mg/kg	302	314	256	278	363	
Tungsten	7440-33-7	E440	0.50	mg/kg	25.1	21.9	23.1	16.9	24.0	
Uranium	7440-61-1	E440	0.050	mg/kg	2.82	2.85	2.99	2.66	3.12	
Vanadium	7440-62-2	E440	0.20	mg/kg	36.8	43.1	43.3	34.6	41.4	
Zinc	7440-66-6	E440	2.0	mg/kg	4140	4150	3680	3780	4680	
Zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.7	2.0	2.8	3.4	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.7	11.6	11.6	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.92	6.01	6.17	5.78	5.52	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.79	6.37	6.17	6.52	6.49	
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	2.35	2.36	2.34	2.47	2.57	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.066	0.117	0.150	0.091	0.105	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1970	2060	2040	2100	2140	
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	0.820	0.952	1.25	1.76	1.11	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.592	0.612	0.367	0.657	0.425	
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	0.50	<0.25	<0.25	<0.25	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	148	142	145	142	
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	0.36	0.57	0.79	0.47	0.56	
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	BA2311-A-1	BA2311-A-2	BA2311-A-3	BA2311-A-4	BA2311-A-5
Client sampling date / time					15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-001	VA23A6191-002	VA23A6191-003	VA23A6191-004	VA23A6191-005	
TCLP Metals					Result	Result	Result	Result	Result	
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	6.28	19.8	20.3	12.2	15.7	
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	BA2311-A-6	BA2311-A-7	BA2311-A-8	BA2311-A-9	BA2311-A-10
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-006	VA23A6191-007	VA23A6191-008	VA23A6191-009	VA23A6191-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
Moisture	----	E144	0.25	%	25.1	23.4	24.6	23.2	24.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.9	10.8	10.8	11.0	
<b>Metals</b>										
Aluminum	7429-90-5	E440	50	mg/kg	33000	47300	37400	35500	40900	
Antimony	7440-36-0	E440	0.10	mg/kg	178	176	166	153	177	
Arsenic	7440-38-2	E440	0.10	mg/kg	20.9	22.6	23.7	23.4	22.4	
Barium	7440-39-3	E440	0.50	mg/kg	469	462	458	486	497	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	0.36	0.37	0.35	
Bismuth	7440-69-9	E440	0.20	mg/kg	11.3	10.3	13.1	16.9	9.39	
Boron	7440-42-8	E440	5.0	mg/kg	191	279	209	202	213	
Cadmium	7440-43-9	E440	0.020	mg/kg	9.49	12.0	11.6	15.2	9.13	
Calcium	7440-70-2	E440	50	mg/kg	149000	156000	151000	148000	141000	
Chromium	7440-47-3	E440	0.50	mg/kg	181	197	488	149	222	
Cobalt	7440-48-4	E440	0.10	mg/kg	80.0	45.3	73.5	32.9	34.8	
Copper	7440-50-8	E440	0.50	mg/kg	16100	1630	1690	948	2360	
Iron	7439-89-6	E440	50	mg/kg	52600	42700	64800	43700	60500	
Lead	7439-92-1	E440	0.50	mg/kg	604	370	359	364	766	
Lithium	7439-93-2	E440	2.0	mg/kg	22.5	25.6	23.3	18.3	22.7	
Magnesium	7439-95-4	E440	20	mg/kg	12600	13000	11300	11700	10400	
Manganese	7439-96-5	E440	1.0	mg/kg	881	852	1230	755	1130	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0959	0.146	0.116	0.102	0.0715	
Molybdenum	7439-98-7	E440	0.10	mg/kg	28.2	21.6	20.7	26.0	53.1	
Nickel	7440-02-0	E440	0.50	mg/kg	122	156	263	84.0	262	
Phosphorus	7723-14-0	E440	50	mg/kg	11600	11600	11800	10800	12600	
Potassium	7440-09-7	E440	100	mg/kg	5730	5900	4900	5230	5580	
Selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.47	0.39	0.41	0.37	
Silver	7440-22-4	E440	0.10	mg/kg	9.83	8.62	8.48	15.7	4.30	
Sodium	7440-23-5	E440	50	mg/kg	15800	16200	13900	14900	15400	
Strontium	7440-24-6	E440	0.50	mg/kg	323	324	281	297	294	
Sulfur	7704-34-9	E440	1000	mg/kg	13900	16500	12900	12500	13200	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2311-A-6	BA2311-A-7	BA2311-A-8	BA2311-A-9	BA2311-A-10
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-006	VA23A6191-007	VA23A6191-008	VA23A6191-009	VA23A6191-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
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	180	127	160	176	116	
Titanium	7440-32-6	E440	1.0	mg/kg	290	484	359	291	334	
Tungsten	7440-33-7	E440	0.50	mg/kg	21.5	22.2	33.1	28.9	18.1	
Uranium	7440-61-1	E440	0.050	mg/kg	2.72	3.06	2.93	2.62	2.66	
Vanadium	7440-62-2	E440	0.20	mg/kg	42.4	38.9	40.4	33.1	37.4	
Zinc	7440-66-6	E440	2.0	mg/kg	5470	4110	5750	3330	3640	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.0	3.2	1.8	2.5	3.1	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	11.6	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.16	7.21	6.58	7.04	6.33	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.84	6.16	6.79	6.81	6.54	
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	2.53	2.38	2.48	2.39	2.54	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.193	0.124	0.070	0.073	0.088	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1990	2060	2100	2030	2180	
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	0.595	0.948	0.577	1.06	1.22	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.547	0.465	0.540	0.529	0.496	
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	132	149	137	138	152	
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	0.34	0.52	0.41	0.37	0.53	
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					Client sample ID	BA2311-A-6	BA2311-A-7	BA2311-A-8	BA2311-A-9	BA2311-A-10
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00	15-Mar-2023 09:00
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-006	VA23A6191-007	VA23A6191-008	VA23A6191-009	VA23A6191-010	
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	4.48	20.5	7.21	6.17	11.3	
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	BA2311-A-11	BA2311-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-011	VA23A6191-012	-----	-----	-----	
					Result	Result	----	----	----	
<b>Physical Tests</b>										
Moisture	----	E144	0.25	%	21.0	24.7	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	----	----	----	
<b>Metals</b>										
Aluminum	7429-90-5	E440	50	mg/kg	52700	39400	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	164	169	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	25.7	21.5	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	464	409	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.33	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	10.0	10.3	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	184	193	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	10.5	10.3	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	152000	145000	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	141	147	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	76.8	43.1	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	1420	3270	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	45500	49100	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	497	490	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	23.5	23.5	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	11800	10600	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	754	766	----	----	----	
Mercury	7439-97-6	E510	0.0500	mg/kg	0.136	0.101	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	21.3	20.8	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	102	146	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	12800	12100	----	----	----	
Potassium	7440-09-7	E440	100	mg/kg	5490	5320	----	----	----	
Selenium	7782-49-2	E440	0.20	mg/kg	0.32	0.35	----	----	----	
Silver	7440-22-4	E440	0.10	mg/kg	9.61	5.42	----	----	----	
Sodium	7440-23-5	E440	50	mg/kg	15700	14800	----	----	----	
Strontium	7440-24-6	E440	0.50	mg/kg	299	307	----	----	----	
Sulfur	7704-34-9	E440	1000	mg/kg	14000	12400	----	----	----	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2311-A-11	BA2311-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:00	15-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-011	VA23A6191-012	-----	-----	-----	
					Result	Result	----	----	----	
<b>Metals</b>										
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	
Tin	7440-31-5	E440	2.0	mg/kg	116	140	----	----	----	
Titanium	7440-32-6	E440	1.0	mg/kg	394	284	----	----	----	
Tungsten	7440-33-7	E440	0.50	mg/kg	65.8	25.6	----	----	----	
Uranium	7440-61-1	E440	0.050	mg/kg	3.05	2.90	----	----	----	
Vanadium	7440-62-2	E440	0.20	mg/kg	37.7	36.0	----	----	----	
Zinc	7440-66-6	E440	2.0	mg/kg	3760	3640	----	----	----	
Zirconium	7440-67-7	E440	1.0	mg/kg	3.4	2.9	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.29	6.17	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.47	6.71	----	----	----	
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	2.14	2.37	----	----	----	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.090	0.112	----	----	----	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1880	2020	----	----	----	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.03	1.03	----	----	----	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.702	0.504	----	----	----	
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	132	140	----	----	----	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.40	0.52	----	----	----	
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		BA2311-A-11	BA2311-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		15-Mar-2023 09:00	15-Mar-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6191-011	VA23A6191-012	-----	-----	-----	-----	-----
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	14.9	6.65	---	---	---	---	---
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><b>Work Order</b> : <b>VA23A6191</b></p> <p><b>Client</b> : <b>Covanta Burnaby Renewable Energy, ULC</b></p> <p><b>Contact</b> : Nicole Victor</p> <p><b>Address</b> : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p><b>Telephone</b> : ----</p> <p><b>Project</b> : Weekly Bottom Ash - Suite</p> <p><b>PO</b> : VANCO0000051998</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : Standing Offer (BC work)</p> <p><b>No. of samples received</b> : 12</p> <p><b>No. of samples analysed</b> : 12</p>	<p><b>Page</b> : 1 of 16</p> <p><b>Laboratory</b> : Vancouver - Environmental</p> <p><b>Account Manager</b> : Brent Mack</p> <p><b>Address</b> : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p><b>Telephone</b> : 778-370-3279</p> <p><b>Date Samples Received</b> : 22-Mar-2023 14:06</p> <p><b>Issue Date</b> : 27-Mar-2023 15:46</p>
---	---

---

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
<b>Duplicate (DUP) RPDs</b>								
Metals	VA23A6191-001	BA2311-A-1	Cadmium	7440-43-9	E440	53.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6191-001	BA2311-A-1	Cobalt	7440-48-4	E440	62.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A6191-001	BA2311-A-1	Copper	7440-50-8	E440	127 % 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	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-1	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-10	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-11	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-12	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-2	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-3	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2311-A-4	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 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		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2311-A-5	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2311-A-6	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2311-A-7	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2311-A-8	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2311-A-9	E510	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	28 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2311-A-1	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2311-A-10	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2311-A-11	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2311-A-12	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 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		
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-2	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-3	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-4	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-5	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-6	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-7	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-8	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2311-A-9	E440	15-Mar-2023	24-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2311-A-1	E144	15-Mar-2023	----	----	----		23-Mar-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	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-10	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-11	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-12	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-2	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-3	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-4	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-5	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-6	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2311-A-7	E144	15-Mar-2023	----	----	----		23-Mar-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		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2311-A-8	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2311-A-9	E144	15-Mar-2023	----	----	----		23-Mar-2023	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-1	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-10	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-11	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-12	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-2	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-3	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-4	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 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		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-5	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-6	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-7	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-8	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2311-A-9	E108	15-Mar-2023	24-Mar-2023	----	----		25-Mar-2023	30 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-1	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-10	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-11	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-12	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-2	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-3	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-4	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-5	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-6	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-7	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-8	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2311-A-9	E512	24-Mar-2023	27-Mar-2023	----	----		27-Mar-2023	28 days	12 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-1	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 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		
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-10	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-11	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-12	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-2	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-3	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-4	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-5	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-6	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2311-A-7	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 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	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2311-A-8	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2311-A-9	E444	24-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	11 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-1	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-10	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-11	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-12	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-2	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-3	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-4	EPP444	15-Mar-2023	24-Mar-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	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-5	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-6	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-7	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-8	EPP444	15-Mar-2023	24-Mar-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2311-A-9	EPP444	15-Mar-2023	24-Mar-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
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Mercury in Soil/Solid by CVAAS	E510	874188	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	874189	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	874191	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	874190	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	874188	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	874189	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	874191	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	874190	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	876113	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	874188	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	876114	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	874189	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	874191	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	876113	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	876114	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 $105^{\circ}\text{C}$ . 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 $\text{HNO}_3$ and $\text{HCl}$ .  Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines.  Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444  Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510  Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with $\text{HNO}_3$ and $\text{HCl}$ , 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.

Page : 16 of 16  
 Work Order : VA23A6191  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> 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

<b>Work Order</b>	<b>: VA23A6191</b>	<b>Page</b>	: 1 of 11
<b>Client</b>	: Covanta Burnaby Renewable Energy, ULC	<b>Laboratory</b>	: Vancouver - Environmental
<b>Contact</b>	: Nicole Victor	<b>Account Manager</b>	: Brent Mack
<b>Address</b>	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	<b>Address</b>	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
<b>Telephone</b>	:	<b>Telephone</b>	: 778-370-3279
<b>Project</b>	: Weekly Bottom Ash - Suite	<b>Date Samples Received</b>	: 22-Mar-2023 14:06
<b>PO</b>	: VANCO0000051998	<b>Date Analysis Commenced</b>	: 23-Mar-2023
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 27-Mar-2023 15:48
<b>Sampler</b>	: ----            ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: Standing Offer (BC work)		
<b>No. of samples received</b>	: 12		
<b>No. of samples analysed</b>	: 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>
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Parnian Sane	Analyst	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
<b>Physical Tests (QC Lot: 874190)</b>											
VA23A6191-001	BA2311-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.4%	5%	----
<b>Physical Tests (QC Lot: 874191)</b>											
VA23A6191-001	BA2311-A-1	Moisture	----	E144	0.25	%	24.3	24.8	2.13%	20%	----
<b>Metals (QC Lot: 874188)</b>											
VA23A6191-001	BA2311-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.122	0.115	0.0078	Diff <2x LOR	----
<b>Metals (QC Lot: 874189)</b>											
VA23A6191-001	BA2311-A-1	Aluminum	7429-90-5	E440	50	mg/kg	33400	33800	1.21%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	170	157	8.39%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	24.0	23.7	1.18%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	472	465	1.51%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.48	0.11	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.16	9.01	1.64%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	215	222	3.40%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	17.2	9.95	53.3%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	146000	160000	9.02%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	141	133	5.74%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	77.0	40.5	62.2%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	6030	1340	127%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	44800	44000	1.83%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	303	348	13.9%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	25.8	26.3	1.66%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11400	12100	6.18%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	703	664	5.74%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	18.6	19.2	2.74%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	142	145	2.44%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	12200	13900	13.0%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5800	5520	4.92%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.38	0.005	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.18	4.33	17.8%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	16400	15500	5.50%	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
<b>Metals (QC Lot: 874189) - continued</b>											
VA23A6191-001	BA2311-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	286	306	6.46%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	13000	13500	3.65%	30%	----
		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	132	150	12.7%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	302	219	31.6%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	25.1	21.7	14.2%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.82	2.86	1.47%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	36.8	36.8	0.0823%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4140	3290	22.9%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.1	0.3	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
<b>Physical Tests (QCLot: 874191)</b>						
Moisture	---	E144	0.25	%	<0.25	---
<b>Metals (QCLot: 874188)</b>						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
<b>Metals (QCLot: 874189)</b>						
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
<b>Metals (QCLot: 874189) - continued</b>						
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	----
<b>TCLP Metals (QCLot: 876113)</b>						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 876114)</b>						
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
<b>Physical Tests (QCLot: 874190)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
<b>Physical Tests (QCLot: 874191)</b>									
Moisture	----	E144	0.25	%	50 %	99.2	90.0	110	----
<b>Metals (QCLot: 874188)</b>									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
<b>Metals (QCLot: 874189)</b>									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	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	92.3	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	91.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	87.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	89.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	85.5	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	89.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	89.8	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	85.4	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	85.9	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	84.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	86.9	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	90.4	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	88.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	94.7	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	87.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	91.0	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	84.7	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	91.0	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	88.6	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.4	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	84.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	86.1	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.2	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.4	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
<b>Metals (QCLot: 874189) - continued</b>									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	88.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	83.3	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	88.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	87.5	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	88.7	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	90.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	86.6	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
<b>TCLP Metals (QCLot: 876113)</b>										
VA23A6191-001	BA2311-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.2	50.0	140	----
<b>TCLP Metals (QCLot: 876114)</b>										
VA23A6191-001	BA2311-A-1	Antimony, TCLP	7440-36-0	E444	4.94 mg/L	5 mg/L	98.8	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	97.1	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.1	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.240 mg/L	0.25 mg/L	96.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.13 mg/L	10 mg/L	91.3	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.239 mg/L	0.25 mg/L	95.7	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	95.2	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	2.28 mg/L	2.5 mg/L	91.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	239 mg/L	250 mg/L	95.8	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.31 mg/L	10 mg/L	93.1	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	225 mg/L	250 mg/L	89.9	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.33 mg/L	2.5 mg/L	93.1	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.88 mg/L	5 mg/L	97.7	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	93.7	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.04 mg/L	5 mg/L	101	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.72 mg/L	0.75 mg/L	96.8	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.21 mg/L	10 mg/L	92.1	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	87.4	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:

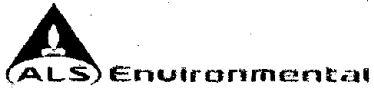
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
<b>Metals (QCLot: 874188)</b>									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	126	70.0	130	----
<b>Metals (QCLot: 874189)</b>									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	97.1	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	96.2	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	92.6	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	93.4	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	93.0	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	98.6	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	91.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	99.6	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	94.1	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	89.1	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	90.0	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	84.6	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	95.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	87.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	97.7	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	92.1	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	91.5	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	91.7	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	81.4	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	95.1	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	88.0	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	87.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	88.1	70.0	130	----

Page : 11 of 11  
 Work Order : VA23A6191  
 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	
<b>Metals (QCLot: 874189) - continued</b>									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	95.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	91.9	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	93.7	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	80.6	70.0	130	----



<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (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	Fax:			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 2:	:riohanson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
		Email 3:	:dskrypnik@covanta.com		<b>Analysis Request</b>	
			:brent.kirkpatrick@metrovancover.org			
			:Sarah.Wellman@metrovancover.org			

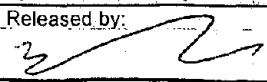
<b>Invoice To</b> Same as Report ?		<b>Client / Project Information</b>		Please indicate below Filtered, Preserved or both (F, P, F/P)	
Hardcopy of Invoice with Report?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:			
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite		
Contact:		LSD:	(includes 2:1 pH)		
Address:		Quote #:			
Phone:					

<b>Lab Work Order #</b> (lab use only)		<b>ALS Contact:</b>	<b>Sampler:</b>
---	--	---------------------	-----------------

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				
BA2311-A-1	Environmental Division Vancouver Work Order Reference <b>VA23A6191</b>  Telephone : +1 604 253 4188	15-Mar-23	9:00	Soil	X	X		X														1	
BA2311-A-2		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-3		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-4		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-5		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-6		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-7		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-8		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-9		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-10		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-11		15-Mar-23	9:00	Soil	X	X		X															1
BA2311-A-12		15-Mar-23	9:00	Soil	X	X		X															1

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

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

<b>SHIPMENT RELEASE (client use)</b>			<b>SHIPMENT RECEPTION (lab use only)</b>				<b>SHIPMENT VERIFICATION (lab use only)</b>			
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
	22-Mar-23	08:00	RD	March 23, 23	2:06pm	20 °C				