

## Bottom Ash Data

2021 Week 8

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on March 4, 2021. The data represents bottom ash composite results for week 8 of 2021 (February 14, 2021 to February 20, 2021).

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



**CERTIFICATE OF ANALYSIS**

**Work Order** : **VA21A3225**  
**Client** : **Covanta Burnaby Renewable Energy, ULC**  
**Contact** : Steve McKinney  
**Address** : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
**Telephone** : 604 521 1025  
**Project** : Weekly Bottom Ash-Suite  
**PO** : VANCO 0000050390  
**C-O-C number** : ----  
**Sampler** : ----  
**Site** : ----  
**Quote number** : Standing Offer (BC work)  
**No. of samples received** : 12  
**No. of samples analysed** : 12

**Page** : 1 of 11  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Brent Mack  
**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
**Telephone** : 778-370-3279  
**Date Samples Received** : 23-Feb-2021 12:25  
**Date Analysis Commenced** : 25-Feb-2021  
**Issue Date** : 03-Mar-2021 09:40

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
Ann Ho	Laboratory Analyst	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Dee Lee	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 in reports identified as "Preliminary Report" are considered authorized for use.



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2108-A-1	BA2108-A-2	BA2108-A-3	BA2108-A-4	BA2108-A-5
(Matrix: Soil/Solid)					Client sampling date / time	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-001	VA21A3225-002	VA21A3225-003	VA21A3225-004	VA21A3225-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.3	23.1	21.3	22.6	22.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	12.0	11.8	11.8	11.9	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	29600	38000	31200	29000	35500	
antimony	7440-36-0	E440	0.10	mg/kg	160	147	130	117	118	
arsenic	7440-38-2	E440	0.10	mg/kg	24.2	21.6	20.4	18.6	25.4	
barium	7440-39-3	E440	0.50	mg/kg	677	624	547	541	564	
beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.39	0.50	0.36	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	5.73	7.27	6.80	6.51	7.24	
boron	7440-42-8	E440	5.0	mg/kg	165	176	203	200	178	
cadmium	7440-43-9	E440	0.020	mg/kg	8.63	11.3	8.46	7.90	8.51	
calcium	7440-70-2	E440	50	mg/kg	124000	148000	141000	131000	140000	
chromium	7440-47-3	E440	0.50	mg/kg	238	197	316	139	174	
cobalt	7440-48-4	E440	0.10	mg/kg	260	95.4	268	108	94.8	
copper	7440-50-8	E440	0.50	mg/kg	18700	4720	2700	2860	2320	
iron	7439-89-6	E440	50	mg/kg	84100	71500	64300	69200	63900	
lead	7439-92-1	E440	0.50	mg/kg	4690	516	1260	596	3420	
lithium	7439-93-2	E440	2.0	mg/kg	36.8	26.7	42.4	21.8	27.5	
magnesium	7439-95-4	E440	20	mg/kg	11400	12400	13800	10700	12000	
manganese	7439-96-5	E440	1.0	mg/kg	1320	1040	907	2000	2110	
mercury	7439-97-6	E510	0.0500	mg/kg	0.216	0.271	0.189	0.205	0.176	
molybdenum	7439-98-7	E440	0.10	mg/kg	28.4	16.7	24.1	17.0	19.8	
nickel	7440-02-0	E440	0.50	mg/kg	222	160	244	129	142	
phosphorus	7723-14-0	E440	50	mg/kg	10100	11800	9970	9900	11900	
potassium	7440-09-7	E440	100	mg/kg	4590	4790	4820	4260	4920	
selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.41	0.36	0.32	0.37	
silver	7440-22-4	E440	0.10	mg/kg	6.11	12.4	5.64	10.2	4.09	
sodium	7440-23-5	E440	50	mg/kg	15200	16100	16300	14600	15900	
strontium	7440-24-6	E440	0.50	mg/kg	294	431	324	295	318	
sulfur	7704-34-9	E440	1000	mg/kg	12800	14200	13300	11700	12800	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2108-A-1	BA2108-A-2	BA2108-A-3	BA2108-A-4	BA2108-A-5
Client sampling date / time						17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-001	VA21A3225-002	VA21A3225-003	VA21A3225-004	VA21A3225-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.052	<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg	444	142	210	146	121	
titanium	7440-32-6	E440	1.0	mg/kg	740	698	460	474	408	
tungsten	7440-33-7	E440	0.50	mg/kg	8.94	14.6	9.65	9.19	8.91	
uranium	7440-61-1	E440	0.050	mg/kg	2.13	2.32	2.33	1.94	2.13	
vanadium	7440-62-2	E440	0.20	mg/kg	30.8	33.6	36.5	28.8	29.6	
zinc	7440-66-6	E440	2.0	mg/kg	4560	4880	3940	3640	4200	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.0	1.5	1.1	1.4	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.1	12.1	12.1	12.1	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.46	6.31	6.19	5.69	5.81	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.63	6.84	6.85	6.82	6.64	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
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	1.90	1.98	2.00	1.90	1.93	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.239	0.107	0.149	0.078	0.101	
calcium, TCLP	7440-70-2	E444	10	mg/L	1820	1970	1950	1890	1880	
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	0.776	0.476	0.716	0.844	0.544	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.511	0.490	0.146	0.418	0.586	
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	134	130	135	131	132	
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	0.37	0.40	0.49	0.57	0.52	
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	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2108-A-1	BA2108-A-2	BA2108-A-3	BA2108-A-4	BA2108-A-5
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-001	VA21A3225-002	VA21A3225-003	VA21A3225-004	VA21A3225-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
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	22.5	15.0	18.9	13.2	21.8	

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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2108-A-6	BA2108-A-7	BA2108-A-8	BA2108-A-9	BA2108-A-10
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-006	VA21A3225-007	VA21A3225-008	VA21A3225-009	VA21A3225-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.8	23.4	23.8	21.6	23.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	11.9	11.9	12.1	12.0	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	32000	40200	35800	48600	33200	
antimony	7440-36-0	E440	0.10	mg/kg	131	126	135	151	147	
arsenic	7440-38-2	E440	0.10	mg/kg	28.4	20.9	20.3	25.2	20.8	
barium	7440-39-3	E440	0.50	mg/kg	557	581	586	548	600	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.39	0.37	0.38	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	6.49	12.9	6.18	11.0	6.84	
boron	7440-42-8	E440	5.0	mg/kg	194	288	193	181	226	
cadmium	7440-43-9	E440	0.020	mg/kg	9.57	8.97	9.95	9.42	10.8	
calcium	7440-70-2	E440	50	mg/kg	153000	146000	143000	146000	145000	
chromium	7440-47-3	E440	0.50	mg/kg	206	158	145	166	158	
cobalt	7440-48-4	E440	0.10	mg/kg	66.7	45.4	149	51.3	42.4	
copper	7440-50-8	E440	0.50	mg/kg	5700	3480	2880	2960	3070	
iron	7439-89-6	E440	50	mg/kg	68200	67600	61400	66900	81800	
lead	7439-92-1	E440	0.50	mg/kg	845	642	1040	954	488	
lithium	7439-93-2	E440	2.0	mg/kg	27.5	23.8	30.4	28.5	25.7	
magnesium	7439-95-4	E440	20	mg/kg	11300	11500	11500	11400	11800	
manganese	7439-96-5	E440	1.0	mg/kg	1140	917	823	948	981	
mercury	7439-97-6	E510	0.0500	mg/kg	0.222	0.191	0.759	0.242	0.208	
molybdenum	7439-98-7	E440	0.10	mg/kg	35.0	17.6	30.4	19.3	18.3	
nickel	7440-02-0	E440	0.50	mg/kg	195	156	166	745	149	
phosphorus	7723-14-0	E440	50	mg/kg	9590	10100	10700	10100	10600	
potassium	7440-09-7	E440	100	mg/kg	4730	5000	4890	4690	5330	
selenium	7782-49-2	E440	0.20	mg/kg	0.41	0.39	0.43	0.41	0.42	
silver	7440-22-4	E440	0.10	mg/kg	4.26	4.11	5.81	22.2	4.51	
sodium	7440-23-5	E440	50	mg/kg	16300	17100	16500	15900	17800	
strontium	7440-24-6	E440	0.50	mg/kg	308	327	328	315	604	
sulfur	7704-34-9	E440	1000	mg/kg	14600	14400	14000	14800	13400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2108-A-6	BA2108-A-7	BA2108-A-8	BA2108-A-9	BA2108-A-10
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-006	VA21A3225-007	VA21A3225-008	VA21A3225-009	VA21A3225-010
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	169	143	317	661	257
titanium	7440-32-6	E440	1.0	mg/kg	567	562	630	960	551
tungsten	7440-33-7	E440	0.50	mg/kg	10.4	6.63	9.58	8.88	7.56
uranium	7440-61-1	E440	0.050	mg/kg	2.36	2.61	2.11	2.34	2.25
vanadium	7440-62-2	E440	0.20	mg/kg	29.9	31.6	29.6	34.3	31.0
zinc	7440-66-6	E440	2.0	mg/kg	4490	3790	7410	6000	5830
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.2	1.9	1.5	1.1
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.1	12.0	12.1	12.1	12.0
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.73	5.76	5.44	5.45	5.69
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85
pH, TCLP final	----	EPP444	0.010	pH units	6.82	6.76	6.77	6.97	7.13
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
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	2.01	2.05	2.07	1.87	1.92
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.085	0.115	0.074	0.094	0.071
calcium, TCLP	7440-70-2	E444	10	mg/L	1860	1930	1920	1960	1930
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	0.486	1.48	1.09	0.643	0.500
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.563	0.649	0.486	0.561	0.430
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	129	127	133	128	126
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	0.32	0.35	0.34	0.37	0.31
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
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15





## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2108-A-6	BA2108-A-7	BA2108-A-8	BA2108-A-9	BA2108-A-10
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00	17-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-006	VA21A3225-007	VA21A3225-008	VA21A3225-009	VA21A3225-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	16.1	26.3	16.0	23.8	7.03	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2108-A-11	BA2108-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-011	VA21A3225-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.3	23.7	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	12.1	12.0	----	----	----	----
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	41200	32300	----	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	891	140	----	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	20.8	21.2	----	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	513	471	----	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.77	----	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	8.70	7.07	----	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	234	203	----	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	10.6	11.9	----	----	----	----
calcium	7440-70-2	E440	50	mg/kg	147000	142000	----	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	161	159	----	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	69.7	213	----	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	4380	3810	----	----	----	----
iron	7439-89-6	E440	50	mg/kg	63200	57700	----	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	4170	520	----	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	34.8	26.7	----	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	12600	11800	----	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	787	906	----	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.218	0.314	----	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	30.7	17.7	----	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	238	533	----	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	10200	10400	----	----	----	----
potassium	7440-09-7	E440	100	mg/kg	5250	4600	----	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.35	----	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	5.87	9.76	----	----	----	----
sodium	7440-23-5	E440	50	mg/kg	17200	16000	----	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	378	364	----	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	14700	13100	----	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	----



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2108-A-11	BA2108-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-011	VA21A3225-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	424	197	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	524	289	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	9.21	7.69	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	2.55	2.22	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	32.6	30.6	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	3840	4910	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.7	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.1	12.0	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.67	5.65	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.94	6.55	----	----	----	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
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	2.09	1.92	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.093	0.098	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	1850	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.696	0.681	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.421	0.639	----	----	----	
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	138	133	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.35	0.40	----	----	----	
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	----	----	----	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	



**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2108-A-11	BA2108-A-12	----	----	----
Client sampling date / time					17-Feb-2021 09:00	17-Feb-2021 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA21A3225-011	VA21A3225-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	13.5	24.4	----	----	----	

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA21A3225</b>	Page	: 1 of 16
Client	: <b>Covanta Burnaby Renewable Energy, ULC</b>	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 23-Feb-2021 12:25
PO	: VANCO 0000050390	Issue Date	: 03-Mar-2021 09:40
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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 Services number is a unique identifier assigned to discrete substances.

**DQO:** Data Quality Objective.

**LOR:** Limit of Reporting (detection limit).

**RPD:** Relative Percent Difference.

## 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	VA21A3225-001	BA2108-A-1	cadmium	7440-43-9	E440	72.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	cobalt	7440-48-4	E440	137 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	copper	7440-50-8	E440	136 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	lead	7439-92-1	E440	121 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	tin	7440-31-5	E440	66.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	tungsten	7440-33-7	E440	40.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A3225-001	BA2108-A-1	zinc	7440-66-6	E440	107 % 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 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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 BA2108-A-1	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-10	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-11	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-12	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-2	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-3	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-4	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✓	02-Mar-2021	15 days	0 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 BA2108-A-5	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✔	02-Mar-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-6	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✔	02-Mar-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-7	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✔	02-Mar-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-8	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✔	02-Mar-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2108-A-9	E510	17-Feb-2021	01-Mar-2021	28 days	12 days	✔	02-Mar-2021	15 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2108-A-1	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2108-A-10	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2108-A-11	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2108-A-12	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 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 BA2108-A-2	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-3	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-4	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-5	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-6	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-7	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-8	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2108-A-9	E440	17-Feb-2021	01-Mar-2021	180 days	12 days	✔	02-Mar-2021	167 days	1 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2108-A-1	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----		



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 BA2108-A-10	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-11	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-12	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-2	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-3	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-4	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-5	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-6	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2108-A-7	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----	



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 BA2108-A-8	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2108-A-9	E144	17-Feb-2021	----	----	----		27-Feb-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-1	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-10	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-11	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-12	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-2	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-3	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-4	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 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 BA2108-A-5	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-6	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-7	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-8	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2108-A-9	E108	17-Feb-2021	01-Mar-2021	30 days	12 days	✔	01-Mar-2021	17 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2108-A-1	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2108-A-10	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2108-A-11	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2108-A-12	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 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>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-2	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-3	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-4	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-5	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-6	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-7	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-8	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2108-A-9	E512	25-Feb-2021	----	----	----		27-Feb-2021	36 days	10 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2108-A-1	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 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) BA2108-A-10	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-11	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-12	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-2	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-3	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-4	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-5	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-6	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2108-A-7	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 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>										
<b>HDPE - total (lab preserved)</b> BA2108-A-8	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2108-A-9	E444	25-Feb-2021	----	----	----		28-Feb-2021	188 days	11 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-1	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-10	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-11	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-12	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-2	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-3	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-4	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----	





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>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-5	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-6	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-7	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-8	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2108-A-9	EPP444	17-Feb-2021	25-Feb-2021	----	----		----	----	----		

**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 (%)		Evaluation
			QC	Regular	Actual	Expected	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Mercury in Soil/Solid by CVAAS	E510	156334	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	156333	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	156336	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	156335	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	156334	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	156333	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	156336	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	156335	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	156103	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	156334	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	156104	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	156333	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	156336	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	156103	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	156104	1	12	8.3	5.0	✔



## Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	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. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> 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°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 : VA21A3225

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash-Suite
PO : VANCO 0000050390
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 23-Feb-2021 12:25
Date Analysis Commenced : 25-Feb-2021
Issue Date : 03-Mar-2021 09:40

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 Percentage Difference (RPD) and Acceptance Limits
● Matrix Spike (MS) Report; Recovery and Acceptance Limits
● Reference Material (RM) Report; Recovery and Acceptance Limits
● Method Blank (MB) Report; Recovery and Acceptance Limits
● Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Angela Ren (Team Leader - Metals), Ann Ho (Laboratory Analyst), Brianna Allen (Production/Validation Manager), and Dee Lee (Analyst).

Page : 2 of 11  
Work Order : VA21A3225  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : Weekly Bottom Ash-Suite

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## 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 Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

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



### 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: 156335)</b>											
VA21A3225-001	BA2108-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.7	0.515%	5%	----
<b>Physical Tests (QC Lot: 156336)</b>											
VA21A3225-001	BA2108-A-1	moisture	----	E144	0.25	%	22.3	22.5	0.958%	20%	----
<b>Metals (QC Lot: 156333)</b>											
VA21A3225-001	BA2108-A-1	aluminum	7429-90-5	E440	50	mg/kg	29600	40300	30.4%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	160	132	19.6%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	24.2	20.8	14.9%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	677	605	11.3%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.45	0.10	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	5.73	5.87	2.37%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	165	188	13.0%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	8.63	18.4	72.5%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	124000	159000	24.9%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	238	188	23.5%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	260	48.2	137%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	18700	3570	136%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	84100	70600	17.4%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	4690	1150	121%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	36.8	27.8	27.9%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11400	12000	5.19%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1320	1080	20.3%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	28.4	19.2	38.7%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	222	204	8.08%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10100	11200	10.2%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4590	4560	0.782%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.38	0.13	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.11	7.40	19.2%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15200	15700	2.76%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	294	369	22.8%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	12800	14400	12.3%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.052	<0.050	0.002	Diff <2x LOR	----



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: 156333) - continued</b>											
VA21A3225-001	BA2108-A-1	tin	7440-31-5	E440	2.0	mg/kg	444	887	66.6%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	740	793	6.99%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	8.94	13.4	40.3%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	2.13	2.27	6.44%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	30.8	30.6	0.535%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4560	15000	107%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.4	0.4	Diff <2x LOR	----
<b>Metals (QC Lot: 156334)</b>											
VA21A3225-001	BA2108-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.216	0.176	0.0402	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: 156336)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 156333)</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	----
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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 156333) - continued</b>						
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>Metals (QCLot: 156334)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>TCLP Metals (QCLot: 156103)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 156104)</b>						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
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	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----



## 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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Physical Tests (QCLot: 156335)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
<b>Physical Tests (QCLot: 156336)</b>									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
<b>Metals (QCLot: 156333)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	108	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	114	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	111	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	107	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	100.0	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	102	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	111	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	105	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	110	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	114	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	108	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	111	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	110	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	108	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	112	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	113	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	111	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	105	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	107	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	109	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	110	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: 156333) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	109	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	111	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	112	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	101	80.0	120	----
<b>Metals (QCLot: 156334)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	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: 156103)</b>										
VA21A3225-001	BA2108-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----
<b>TCLP Metals (QCLot: 156104)</b>										
VA21A3225-001	BA2108-A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.8 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.248 mg/L	0.25 mg/L	99.1	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.35 mg/L	10 mg/L	93.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.259 mg/L	0.25 mg/L	104	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	1.24 mg/L	1.25 mg/L	99.5	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	2.40 mg/L	2.5 mg/L	96.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	253 mg/L	250 mg/L	101	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.3 mg/L	10 mg/L	103	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	258 mg/L	250 mg/L	103	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.52 mg/L	2.5 mg/L	101	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.28 mg/L	5 mg/L	106	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.125 mg/L	0.1 mg/L	125	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----



## 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: **Soil/Solid**

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: 156333)</b>									
QC-156333-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	110	70.0	130	----
QC-156333-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	102	70.0	130	----
QC-156333-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	115	70.0	130	----
QC-156333-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
QC-156333-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
QC-156333-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
QC-156333-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	112	70.0	130	----
QC-156333-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
QC-156333-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	117	70.0	130	----
QC-156333-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-156333-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
QC-156333-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	109	70.0	130	----
QC-156333-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
QC-156333-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
QC-156333-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
QC-156333-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	114	70.0	130	----
QC-156333-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	124	70.0	130	----
QC-156333-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
QC-156333-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
QC-156333-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	120	70.0	130	----
QC-156333-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
QC-156333-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
QC-156333-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	104	40.0	160	----
QC-156333-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	108	70.0	130	----
QC-156333-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	130	70.0	130	----
QC-156333-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-156333-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----
QC-156333-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	105	70.0	130	----
QC-156333-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	96.2	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A3225  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : Weekly Bottom Ash-Suite



Sub-Matrix: **Soil/Solid**

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: 156334)</b>									
QC-156334-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	95.6	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: Steve McKinney / 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: smckinney@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			<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:			Fax:								

Lab Work Order # (lab use only)		3225	ALS Contact:	Sampler:							Number of Containers
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)			
1	BA2108-A-1	17-Feb-21	9:00	Soil	X	X		X			1
2	BA2108-A-2	17-Feb-21	9:00	Soil	X	X		X			1
3	BA2108-A-3	17-Feb-21	9:00	Soil	X	X		X			1
4	BA2108-A-4	17-Feb-21	9:00	Soil	X	X		X			1
5	BA2108-A-5	17-Feb-21	9:00	Soil	X	X		X			1
6	BA2108-A-6	17-Feb-21	9:00	Soil	X	X		X			1
7	BA2108-A-7	17-Feb-21	9:00	Soil	X	X		X			1
8	BA2108-A-8	17-Feb-21	9:00	Soil	X	X		X			1
9	BA2108-A-9	17-Feb-21	9:00	Soil	X	X		X			1
10	BA2108-A-10	17-Feb-21	9:00	Soil	X	X		X			1
11	BA2108-A-11	17-Feb-21	9:00	Soil	X	X		X			1
12	BA2108-A-12	17-Feb-21	9:00	Soil	X	X		X			1

**Environmental Division  
 Vancouver**  
 Work Order Reference  
**VA21A3225**



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): 23-Feb-21	Time (hh-mm): 0800	Received by:	Date:	Time:	Temperature: 17/18 °C	Verified by:	Date: Feb 23	Time: 12:25 pm	Observations: Yes / No ? Yes add SIF
GENF 20.00 Front										

no ice