

## Bottom Ash Data

2021 Week 39

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The following analytical report represents bottom ash composite results for week 39 of 2021 (September 19, 2021 to September 25, 2021).

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



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA21C1313**  
**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** : 28-Sep-2021 12:10  
**Date Analysis Commenced** : 02-Oct-2021  
**Issue Date** : 08-Oct-2021 15:30

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>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia



## General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2139-A-1	BA2139-A-2	BA2139-A-3	BA2139-A-4	BA2139-A-5
(Matrix: Soil/Solid)					Client sampling date / time	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-001	VA21C1313-002	VA21C1313-003	VA21C1313-004	VA21C1313-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.4	22.4	23.5	22.9	23.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.6	10.6	10.7	10.7	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	35300	39000	36600	44900	34900	
antimony	7440-36-0	E440	0.10	mg/kg	134	122	118	115	133	
arsenic	7440-38-2	E440	0.10	mg/kg	34.1	24.4	26.9	24.9	29.2	
barium	7440-39-3	E440	0.50	mg/kg	480	480	444	560	675	
beryllium	7440-41-7	E440	0.10	mg/kg	0.54	0.43	0.38	0.38	0.41	
bismuth	7440-69-9	E440	0.20	mg/kg	20.7	10.7	11.8	12.0	13.5	
boron	7440-42-8	E440	5.0	mg/kg	201	200	187	271	248	
cadmium	7440-43-9	E440	0.020	mg/kg	12.0	10.0	11.4	11.4	10.2	
calcium	7440-70-2	E440	50	mg/kg	145000	139000	134000	132000	136000	
chromium	7440-47-3	E440	0.50	mg/kg	176	192	179	148	237	
cobalt	7440-48-4	E440	0.10	mg/kg	35.0	61.0	75.0	77.8	59.1	
copper	7440-50-8	E440	0.50	mg/kg	2360	2740	10800	1310	3230	
iron	7439-89-6	E440	50	mg/kg	56500	47600	67400	55300	82700	
lead	7439-92-1	E440	0.50	mg/kg	586	474	446	1500	1060	
lithium	7439-93-2	E440	2.0	mg/kg	22.4	24.2	24.7	19.3	19.0	
magnesium	7439-95-4	E440	20	mg/kg	12900	12200	11400	12900	13200	
manganese	7439-96-5	E440	1.0	mg/kg	777	936	816	775	895	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	50.9	44.0	189	35.9	44.0	
nickel	7440-02-0	E440	0.50	mg/kg	166	183	344	148	177	
phosphorus	7723-14-0	E440	50	mg/kg	10900	11800	10600	10300	9120	
potassium	7440-09-7	E440	100	mg/kg	6500	6130	5960	6130	5800	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.36	0.34	0.25	0.31	
silver	7440-22-4	E440	0.10	mg/kg	7.32	6.85	6.43	8.12	5.74	
sodium	7440-23-5	E440	50	mg/kg	16800	17300	15700	16600	15800	
strontium	7440-24-6	E440	0.50	mg/kg	321	360	313	288	303	
sulfur	7704-34-9	E440	1000	mg/kg	15600	14300	13500	13100	12800	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2139-A-1	BA2139-A-2	BA2139-A-3	BA2139-A-4	BA2139-A-5
Client sampling date / time					22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-001	VA21C1313-002	VA21C1313-003	VA21C1313-004	VA21C1313-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.053	<0.050	0.054	<0.050	0.059	
tin	7440-31-5	E440	2.0	mg/kg	126	112	120	109	150	
titanium	7440-32-6	E440	1.0	mg/kg	567	610	374	860	606	
tungsten	7440-33-7	E440	0.50	mg/kg	20.7	16.0	15.2	18.0	21.0	
uranium	7440-61-1	E440	0.050	mg/kg	4.38	4.02	3.90	3.81	3.69	
vanadium	7440-62-2	E440	0.20	mg/kg	48.7	43.6	45.6	47.0	49.3	
zinc	7440-66-6	E440	2.0	mg/kg	5040	4010	4190	5170	3810	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.8	2.4	1.8	1.4	
<b>Speciated Metals</b>										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.52	----	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.3	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.74	7.33	8.80	8.81	8.73	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.29	6.99	6.39	6.18	7.16	
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	2.16	2.27	2.17	2.17	2.26	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.267	0.154	0.363	0.293	0.171	
calcium, TCLP	7440-70-2	E444	10	mg/L	2090	2120	2070	2000	2160	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.790	1.51	0.764	1.19	0.655	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.835	0.691	0.599	0.516	0.802	
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	130	131	130	125	134	
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	0.52	0.56	0.47	0.54	0.55	
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	BA2139-A-1	BA2139-A-2	BA2139-A-3	BA2139-A-4	BA2139-A-5
Client sampling date / time					22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-001	VA21C1313-002	VA21C1313-003	VA21C1313-004	VA21C1313-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	37.2	53.5	43.4	52.3	31.2	31.2
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2139-A-6	BA2139-A-7	BA2139-A-8	BA2139-A-9	BA2139-A-10
Client sampling date / time					22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-006	VA21C1313-007	VA21C1313-008	VA21C1313-009	VA21C1313-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.3	23.9	23.2	23.4	23.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	10.7	10.7	10.8	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	44300	37000	53800	43100	42500	
antimony	7440-36-0	E440	0.10	mg/kg	131	121	124	137	197	
arsenic	7440-38-2	E440	0.10	mg/kg	27.3	31.5	25.2	31.1	27.0	
barium	7440-39-3	E440	0.50	mg/kg	585	669	632	599	557	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.36	0.39	0.41	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	14.9	10.4	12.2	11.8	23.3	
boron	7440-42-8	E440	5.0	mg/kg	206	239	209	291	183	
cadmium	7440-43-9	E440	0.020	mg/kg	16.1	9.96	11.2	9.82	13.6	
calcium	7440-70-2	E440	50	mg/kg	143000	141000	141000	144000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	144	163	159	140	255	
cobalt	7440-48-4	E440	0.10	mg/kg	28.6	47.6	40.7	27.6	157	
copper	7440-50-8	E440	0.50	mg/kg	1550	2130	2740	1390	1270	
iron	7439-89-6	E440	50	mg/kg	45700	83000	54100	71800	47400	
lead	7439-92-1	E440	0.50	mg/kg	1790	287	308	404	2260	
lithium	7439-93-2	E440	2.0	mg/kg	28.2	20.3	26.2	23.6	24.6	
magnesium	7439-95-4	E440	20	mg/kg	13000	12200	11300	12000	11100	
manganese	7439-96-5	E440	1.0	mg/kg	729	1270	951	1960	736	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	41.2	35.7	68.3	35.8	37.1	
nickel	7440-02-0	E440	0.50	mg/kg	122	121	154	100	139	
phosphorus	7723-14-0	E440	50	mg/kg	11100	10300	10700	10900	10300	
potassium	7440-09-7	E440	100	mg/kg	5770	6160	5890	6350	5920	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.35	0.37	0.38	0.32	
silver	7440-22-4	E440	0.10	mg/kg	10.9	13.6	6.22	5.76	6.26	
sodium	7440-23-5	E440	50	mg/kg	16500	16900	16300	17200	16800	
strontium	7440-24-6	E440	0.50	mg/kg	328	315	310	320	288	
sulfur	7704-34-9	E440	1000	mg/kg	15100	13800	14100	13900	14200	
thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	<0.050	<0.050	<0.050	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2139-A-6	BA2139-A-7	BA2139-A-8	BA2139-A-9	BA2139-A-10
Client sampling date / time					22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-006	VA21C1313-007	VA21C1313-008	VA21C1313-009	VA21C1313-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	139	116	118	106	120	
titanium	7440-32-6	E440	1.0	mg/kg	760	956	1560	835	1030	
tungsten	7440-33-7	E440	0.50	mg/kg	17.4	17.0	21.2	17.3	19.3	
uranium	7440-61-1	E440	0.050	mg/kg	3.90	3.80	3.91	3.95	3.83	
vanadium	7440-62-2	E440	0.20	mg/kg	45.0	51.4	48.9	49.5	48.7	
zinc	7440-66-6	E440	2.0	mg/kg	9460	6190	4280	4180	4800	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.4	2.5	1.7	1.6	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.35	8.81	8.26	9.16	9.26	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.65	6.83	6.55	6.88	7.41	
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	2.21	2.18	2.18	2.06	2.07	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.186	0.153	0.148	0.118	0.160	
calcium, TCLP	7440-70-2	E444	10	mg/L	2070	2030	2020	1990	1960	
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	0.523	0.977	1.31	0.976	0.564	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.649	0.525	0.723	0.436	0.649	
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	159	124	125	121	119	
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	0.50	0.41	0.54	0.52	0.42	
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	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	





## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2139-A-6	BA2139-A-7	BA2139-A-8	BA2139-A-9	BA2139-A-10
Client sampling date / time					22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00	22-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-006	VA21C1313-007	VA21C1313-008	VA21C1313-009	VA21C1313-010	
					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	41.2	25.3	24.4	37.4	23.0	
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	BA2139-A-11	BA2139-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	22-Sep-2021 09:00	22-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-011	VA21C1313-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.1	23.1	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	45500	32600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	134	140	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	29.4	28.8	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	488	405	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.40	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	26.4	12.3	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	259	223	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	10.0	12.3	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	135000	146000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	287	199	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	40.0	31.5	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	6940	1820	----	----	----	
iron	7439-89-6	E440	50	mg/kg	69300	36800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	808	536	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	79.3	20.6	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10900	12200	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1520	715	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	43.1	48.3	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	148	145	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11700	10500	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	6570	6230	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.32	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	7.05	9.72	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17900	17000	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	287	321	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14700	15800	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2139-A-11	BA2139-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	22-Sep-2021 09:00	22-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-011	VA21C1313-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	332	304	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	572	371	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	17.6	23.6	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	4.09	4.29	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	49.3	48.3	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	5780	4220	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	1.6	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.86	8.79	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	7.13	6.82	----	----	----	
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	2.06	2.20	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.140	0.129	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	1860	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.505	0.478	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.400	0.417	----	----	----	
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	119	113	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.33	0.41	----	----	----	
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	----	----	----	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2139-A-11	BA2139-A-12	----	----	----
					Client sampling date / time	22-Sep-2021 09:00	22-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C1313-011	VA21C1313-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>TCLP Metals</b>										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	20.0	22.6	----	----	----	
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

Work Order	: <b>VA21C1313</b>	Page	: 1 of 15
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	: 28-Sep-2021 12:10
PO	: VANCO 0000050390	Issue Date	: 08-Oct-2021 15:30
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	VA21C1313-001	BA2139-A-1	bismuth	7440-69-9	E440	59.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	chromium	7440-47-3	E440	52.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	cobalt	7440-48-4	E440	53.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	copper	7440-50-8	E440	41.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	lead	7439-92-1	E440	43.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	tungsten	7440-33-7	E440	70.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C1313-001	BA2139-A-1	zinc	7440-66-6	E440	41.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

**Result Qualifiers**

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



## Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-1	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-10	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-11	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-12	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-2	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-3	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-4	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 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 BA2139-A-5	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-6	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-7	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-8	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2139-A-9	E510	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	28 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2139-A-1	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2139-A-10	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2139-A-11	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2139-A-12	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 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 ICPCS</b>											
LDPE bag BA2139-A-2	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-3	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-4	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-5	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-6	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-7	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-8	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2139-A-9	E440	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	180 days	15 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2139-A-1	E144	22-Sep-2021	----	----	----		05-Oct-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 BA2139-A-10	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-11	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-12	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-2	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-3	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-4	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-5	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-6	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2139-A-7	E144	22-Sep-2021	----	----	----		05-Oct-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 BA2139-A-8	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2139-A-9	E144	22-Sep-2021	----	----	----		05-Oct-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-1	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-10	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-11	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-12	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-2	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-3	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-4	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-5	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-6	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-7	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-8	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2139-A-9	E108	22-Sep-2021	06-Oct-2021	----	----		06-Oct-2021	30 days	14 days	✔	
<b>Speciated Metals : Hexavalent Chromium (Cr VI) by IC</b>											
Glass soil jar/Teflon lined cap BA2139-A-1	E532	22-Sep-2021	07-Oct-2021	30 days	15 days	✔	08-Oct-2021	7 days	1 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2139-A-1	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2139-A-10	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2139-A-11	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-12	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-2	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-3	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-4	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-5	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-6	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-7	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-8	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-9	E512	02-Oct-2021	----	----	----		06-Oct-2021	----	14 days	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-1	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-10	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-11	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-12	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-2	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-3	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-4	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-5	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2139-A-6	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2139-A-7	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2139-A-8	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2139-A-9	E444	02-Oct-2021	----	----	----		06-Oct-2021	180 days	14 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> BA2139-A-1	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-10	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-11	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-12	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-2	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-3	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-4	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-5	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-6	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-7	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-8	EPP444	22-Sep-2021	02-Oct-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> BA2139-A-9	EPP444	22-Sep-2021	02-Oct-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>							
Hexavalent Chromium (Cr VI) by IC	E532	313642	1	3	33.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	311978	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	311977	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	311980	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	311979	1	12	8.3	5.0	✓
<b>Laboratory Control Samples (LCS)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	313642	2	3	66.6	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	311978	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	311977	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	311980	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	311979	1	12	8.3	5.0	✓
<b>Method Blanks (MB)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	313642	1	3	33.3	5.0	✓
Mercury by CVAAS (TCLP)	E512	312332	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	311978	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	312333	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	311977	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	311980	1	12	8.3	5.0	✓
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	312332	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	312333	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, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method.  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 CVAAS ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Hexavalent Chromium (Cr VI) by IC	E532  Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$ ) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532  Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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 : VA21C1313

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 : 28-Sep-2021 12:10
Date Analysis Commenced : 02-Oct-2021
Issue Date : 08-Oct-2021 15:30

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 Caleb Deroche (Lab Analyst, Metals), Dee Lee (Analyst, Metals), Janice Leung (Supervisor - Organics Instrumentation, Organics), Jon Fisher (Department Manager - Inorganics, Inorganics), and Kim Jensen (Department Manager - Metals, Metals).

Page : 2 of 11  
Work Order : VA21C1313  
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: 311979)</b>											
VA21C1313-001	BA2139-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.4%	5%	----
<b>Physical Tests (QC Lot: 311980)</b>											
VA21C1313-001	BA2139-A-1	moisture	----	E144	0.25	%	23.4	22.8	2.38%	20%	----
<b>Metals (QC Lot: 311977)</b>											
VA21C1313-001	BA2139-A-1	aluminum	7429-90-5	E440	50	mg/kg	35300	37200	5.26%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	134	143	6.64%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	34.1	27.3	22.3%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	480	496	3.34%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.54	0.44	0.10	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	20.7	11.2	59.5%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	201	193	3.99%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.0	10.6	12.4%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	145000	142000	2.29%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	176	300	52.4%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	35.0	60.7	53.7%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2360	3600	41.4%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	56500	70300	21.9%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	586	379	43.0%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.4	21.3	4.71%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12900	10900	17.3%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	777	1000	25.1%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	50.9	35.8	34.7%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	166	191	14.3%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10900	12300	12.2%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6500	6310	2.97%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.35	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	7.32	6.99	4.64%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16800	17100	1.85%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	321	302	6.04%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	15600	13500	14.5%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.053	<0.050	0.003	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: 311977) - continued</b>											
VA21C1313-001	BA2139-A-1	tin	7440-31-5	E440	2.0	mg/kg	126	129	1.80%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	567	604	6.46%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	20.7	43.4	70.6%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	4.38	3.98	9.65%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	48.7	48.6	0.365%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5040	3320	41.0%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.4	0.8	Diff <2x LOR	----
<b>Metals (QC Lot: 311978)</b>											
VA21C1313-001	BA2139-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Speciated Metals (QC Lot: 313642)</b>											
RG2100624-040	Anonymous	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.16	0.18	0.03	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: 311980)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 311977)</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: 311977) - 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: 311978)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Speciated Metals (QCLot: 313642)</b>						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 312332)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 312333)</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	----
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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Physical Tests (QCLot: 311979)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.7	95.0	105	---
<b>Physical Tests (QCLot: 311980)</b>									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
<b>Metals (QCLot: 311977)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	115	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	108	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	108	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	104	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	107	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	100	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	108	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	108	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	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	108	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	104	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: 311977) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	106	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	109	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
<b>Metals (QCLot: 311978)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
<b>Speciated Metals (QCLot: 313642)</b>									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	93.0	80.0	120	----



### Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
<b>TCLP Metals (QCLot: 312332)</b>										
VA21C1313-001	BA2139-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	90.1	50.0	140	----
<b>TCLP Metals (QCLot: 312333)</b>										
VA21C1313-001	BA2139-A-1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	98.4	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.3	50.0	140	----
		barium, TCLP	7440-39-3	E444	10.8 mg/L	12.5 mg/L	86.3	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.217 mg/L	0.25 mg/L	86.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.16 mg/L	10 mg/L	91.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	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	1.09 mg/L	1.25 mg/L	87.3	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.16 mg/L	2.5 mg/L	86.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	220 mg/L	250 mg/L	88.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.35 mg/L	10 mg/L	93.5	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	219 mg/L	250 mg/L	87.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.22 mg/L	2.5 mg/L	88.7	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.49 mg/L	5 mg/L	89.9	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.101 mg/L	0.1 mg/L	101	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	91.5	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.68 mg/L	5 mg/L	93.5	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.68 mg/L	0.75 mg/L	90.7	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	85.9	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: **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: 311977)</b>									
QC-311977-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	114	70.0	130	----
QC-311977-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	106	70.0	130	----
QC-311977-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	112	70.0	130	----
QC-311977-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
QC-311977-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	119	70.0	130	----
QC-311977-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	128	40.0	160	----
QC-311977-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
QC-311977-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	111	70.0	130	----
QC-311977-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	114	70.0	130	----
QC-311977-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	107	70.0	130	----
QC-311977-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	111	70.0	130	----
QC-311977-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	107	70.0	130	----
QC-311977-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	107	70.0	130	----
QC-311977-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	112	70.0	130	----
QC-311977-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	112	70.0	130	----
QC-311977-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
QC-311977-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	105	70.0	130	----
QC-311977-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	109	70.0	130	----
QC-311977-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	106	70.0	130	----
QC-311977-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	122	70.0	130	----
QC-311977-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
QC-311977-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
QC-311977-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	102	40.0	160	----
QC-311977-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	103	70.0	130	----
QC-311977-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	125	70.0	130	----
QC-311977-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	103	70.0	130	----
QC-311977-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	113	70.0	130	----
QC-311977-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	106	70.0	130	----
QC-311977-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	106	70.0	130	----

Page : 11 of 11  
 Work Order : VA21C1313  
 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: 311978)</b>									
QC-311978-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	88.0	70.0	130	----
<b>Speciated Metals (QCLot: 313642)</b>									
QC-313642-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	203 mg/kg	74.6	70.0	130	----

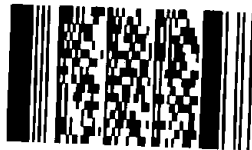


<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business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

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

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
	Lab Work Order # (lab use only) <b>1313</b>	ALS Contact:	Sampler:						
BA2139-A-1		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-2		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-3		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-4		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-5		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-6		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-7		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-8		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-9		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-10		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-11		22-Sep-21	9:00	Soil	X	X	X	X	1
BA2139-A-12		22-Sep-21	9:00	Soil	X	X	X	X	1

Environmental Division  
 Vancouver  
 Work Order Reference  
**VA21C1313**



Telephone : +1 604 253 4188

Special Instructions / Regulations / Use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	28-Sep-21	0800				21 °C	JVV	Sep 28	12:10	

x 2 buckets 2021 pm