

## Bottom Ash Data

2021 Week 11

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on March 26, 2021. The data represents bottom ash composite results for week 11 of 2021 (March 7, 2021 to March 13, 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 : **VA21A4933**  
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 : 17-Mar-2021 10:50  
Date Analysis Commenced : 20-Mar-2021  
Issue Date : 25-Mar-2021 13:02

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
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia



## General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2111-A-1	BA2111-A-2	BA2111-A-3	BA2111-A-4	BA2111-A-5
(Matrix: Soil/Solid)					Client sampling date / time	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-001	VA21A4933-002	VA21A4933-003	VA21A4933-004	VA21A4933-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.1	21.6	21.6	22.3	22.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	11.4	11.2	11.3	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	31700	36700	36700	39300	38700	
antimony	7440-36-0	E440	0.10	mg/kg	143	149	124	154	135	
arsenic	7440-38-2	E440	0.10	mg/kg	22.2	21.2	22.1	21.6	22.0	
barium	7440-39-3	E440	0.50	mg/kg	452	487	447	498	515	
beryllium	7440-41-7	E440	0.10	mg/kg	0.49	0.35	0.38	0.35	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	11.3	9.78	9.50	10.9	10.8	
boron	7440-42-8	E440	5.0	mg/kg	215	225	215	244	205	
cadmium	7440-43-9	E440	0.020	mg/kg	11.5	14.4	9.87	9.41	10.2	
calcium	7440-70-2	E440	50	mg/kg	134000	132000	137000	128000	129000	
chromium	7440-47-3	E440	0.50	mg/kg	257	280	193	245	204	
cobalt	7440-48-4	E440	0.10	mg/kg	43.0	24.2	65.5	86.3	35.8	
copper	7440-50-8	E440	0.50	mg/kg	6100	2640	1790	5650	6520	
iron	7439-89-6	E440	50	mg/kg	75700	79700	66000	74600	65500	
lead	7439-92-1	E440	0.50	mg/kg	492	720	368	1780	513	
lithium	7439-93-2	E440	2.0	mg/kg	21.6	21.4	22.9	27.2	19.3	
magnesium	7439-95-4	E440	20	mg/kg	10800	10900	10500	10200	13400	
manganese	7439-96-5	E440	1.0	mg/kg	906	1140	887	940	882	
mercury	7439-97-6	E510	0.0500	mg/kg	2.19	2.28	1.72	1.65	1.89	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.6	19.6	21.0	29.6	16.4	
nickel	7440-02-0	E440	0.50	mg/kg	204	120	174	160	115	
phosphorus	7723-14-0	E440	50	mg/kg	9570	10300	9710	7950	10200	
potassium	7440-09-7	E440	100	mg/kg	5000	4570	4890	4580	4810	
selenium	7782-49-2	E440	0.20	mg/kg	0.42	0.58	0.36	0.38	0.36	
silver	7440-22-4	E440	0.10	mg/kg	5.52	6.48	13.6	4.73	3.63	
sodium	7440-23-5	E440	50	mg/kg	15200	14100	15800	14100	14800	
strontium	7440-24-6	E440	0.50	mg/kg	278	288	295	334	289	
sulfur	7704-34-9	E440	1000	mg/kg	14100	13500	12300	12800	13100	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2111-A-1	BA2111-A-2	BA2111-A-3	BA2111-A-4	BA2111-A-5
Client sampling date / time					10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-001	VA21A4933-002	VA21A4933-003	VA21A4933-004	VA21A4933-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	0.068	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	842	206	110	198	117	
titanium	7440-32-6	E440	1.0	mg/kg	366	664	464	1380	845	
tungsten	7440-33-7	E440	0.50	mg/kg	8.40	16.8	16.3	9.79	11.4	
uranium	7440-61-1	E440	0.050	mg/kg	2.29	2.15	2.30	2.05	2.22	
vanadium	7440-62-2	E440	0.20	mg/kg	41.4	48.7	46.3	42.8	44.2	
zinc	7440-66-6	E440	2.0	mg/kg	4480	7200	3750	10600	16200	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.6	1.6	1.3	1.3	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.63	9.23	8.97	9.28	9.83	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	7.23	7.19	7.14	6.65	6.51	
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	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	
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	2.05	1.98	2.04	2.11	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.189	0.141	0.167	0.170	0.222	
calcium, TCLP	7440-70-2	E444	10	mg/L	1950	1900	1920	1920	1940	
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	0.500	0.597	0.577	0.847	0.958	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.590	0.727	0.563	0.718	0.971	
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	137	130	125	133	133	
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	0.39	0.39	0.44	1.40	0.46	
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	BA2111-A-1	BA2111-A-2	BA2111-A-3	BA2111-A-4	BA2111-A-5
Client sampling date / time					10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-001	VA21A4933-002	VA21A4933-003	VA21A4933-004	VA21A4933-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
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	24.7	35.2	46.0	31.7	39.2	
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					Client sample ID	BA2111-A-6	BA2111-A-7	BA2111-A-8	BA2111-A-9	BA2111-A-10
(Matrix: Soil/Solid)					Client sampling date / time	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-006	VA21A4933-007	VA21A4933-008	VA21A4933-009	VA21A4933-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.2	21.6	22.5	23.1	22.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.4	11.4	11.3	11.5	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	28600	33100	34800	27400	32800	
antimony	7440-36-0	E440	0.10	mg/kg	163	122	136	215	131	
arsenic	7440-38-2	E440	0.10	mg/kg	23.3	22.6	21.5	33.5	21.3	
barium	7440-39-3	E440	0.50	mg/kg	544	490	480	433	484	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.45	0.38	0.38	0.41	
bismuth	7440-69-9	E440	0.20	mg/kg	8.43	10.9	10.1	11.6	9.22	
boron	7440-42-8	E440	5.0	mg/kg	219	233	194	316	336	
cadmium	7440-43-9	E440	0.020	mg/kg	10.6	15.0	10.8	10.7	9.81	
calcium	7440-70-2	E440	50	mg/kg	128000	138000	140000	138000	142000	
chromium	7440-47-3	E440	0.50	mg/kg	187	177	164	524	323	
cobalt	7440-48-4	E440	0.10	mg/kg	499	25.7	1040	30.7	40.2	
copper	7440-50-8	E440	0.50	mg/kg	2670	1710	4180	4570	2600	
iron	7439-89-6	E440	50	mg/kg	78900	69100	69900	66200	69300	
lead	7439-92-1	E440	0.50	mg/kg	829	524	507	338	532	
lithium	7439-93-2	E440	2.0	mg/kg	42.3	20.2	45.5	22.4	22.5	
magnesium	7439-95-4	E440	20	mg/kg	10500	10800	12000	10800	11300	
manganese	7439-96-5	E440	1.0	mg/kg	798	871	1060	749	778	
mercury	7439-97-6	E510	0.0500	mg/kg	1.72	1.42	1.90	1.41	1.98	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.1	16.8	17.4	19.8	21.5	
nickel	7440-02-0	E440	0.50	mg/kg	138	101	208	436	202	
phosphorus	7723-14-0	E440	50	mg/kg	8520	10500	8920	9480	9550	
potassium	7440-09-7	E440	100	mg/kg	4630	5020	5180	4750	5100	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.59	0.40	0.53	0.40	
silver	7440-22-4	E440	0.10	mg/kg	3.22	8.24	4.33	20.5	4.14	
sodium	7440-23-5	E440	50	mg/kg	14300	15500	14600	14700	15700	
strontium	7440-24-6	E440	0.50	mg/kg	310	295	290	338	294	
sulfur	7704-34-9	E440	1000	mg/kg	12600	13500	13200	13400	12600	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2111-A-6	BA2111-A-7	BA2111-A-8	BA2111-A-9	BA2111-A-10
Client sampling date / time					10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-006	VA21A4933-007	VA21A4933-008	VA21A4933-009	VA21A4933-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	185	144	159	310	119	
titanium	7440-32-6	E440	1.0	mg/kg	598	350	632	332	513	
tungsten	7440-33-7	E440	0.50	mg/kg	8.42	10.0	11.1	15.5	12.6	
uranium	7440-61-1	E440	0.050	mg/kg	2.06	2.74	2.38	2.24	2.56	
vanadium	7440-62-2	E440	0.20	mg/kg	39.6	46.4	45.9	44.9	43.7	
zinc	7440-66-6	E440	2.0	mg/kg	3650	3660	4020	4180	4160	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.1	1.1	<1.0	1.0	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.21	9.04	9.07	9.23	9.58	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.77	6.43	6.42	6.74	6.90	
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	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	
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	2.10	2.06	2.06	2.37	2.29	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.166	0.154	0.155	0.129	0.318	
calcium, TCLP	7440-70-2	E444	10	mg/L	2010	1900	1940	2060	2120	
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	0.492	0.623	0.807	0.946	0.662	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.603	0.686	0.559	0.670	0.351	
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	128	129	146	151	
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	0.38	0.37	0.43	0.50	0.77	
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	BA2111-A-6	BA2111-A-7	BA2111-A-8	BA2111-A-9	BA2111-A-10
Client sampling date / time					10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00	10-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-006	VA21A4933-007	VA21A4933-008	VA21A4933-009	VA21A4933-010	
					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	37.5	59.8	33.7	27.9	29.6	
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	BA2111-A-11	BA2111-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	10-Mar-2021 09:00	10-Mar-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-011	VA21A4933-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.9	21.8	---	---	---	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.4	---	---	---	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	35600	33300	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	129	124	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	22.7	19.8	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	422	440	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.36	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	9.16	8.26	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	190	182	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	9.83	8.98	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	121000	132000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	229	188	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	537	43.1	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	5710	1390	---	---	---	
iron	7439-89-6	E440	50	mg/kg	62300	85500	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	373	838	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	24.0	29.5	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	10800	12200	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	840	920	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	2.26	1.72	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	14.2	16.1	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	161	126	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	8830	8690	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	4940	4840	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.39	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	4.64	7.58	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	14400	14500	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	259	307	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	11900	12000	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2111-A-11	BA2111-A-12	----	----	----
Client sampling date / time					10-Mar-2021 09:00	10-Mar-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-011	VA21A4933-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	156	166	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	532	382	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	6.66	7.22	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	1.88	2.17	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	41.0	39.4	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4120	4220	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.4	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.9	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.70	9.04	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.47	7.34	----	----	----	
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	<10.0 <sup>DLM</sup>	<10.0 <sup>DLM</sup>	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.12	2.44	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.157	0.135	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1960	1900	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.61	0.833	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.882	1.18	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	132	134	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.48	0.33	----	----	----	
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	BA2111-A-11	BA2111-A-12	----	----	----
					Client sampling date / time	10-Mar-2021 09:00	10-Mar-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A4933-011	VA21A4933-012	-----	-----	-----	
					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	56.1	30.9	----	----	----	
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>VA21A4933</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	: 17-Mar-2021 10:50
PO	: VANCO 0000050390	Issue Date	: 25-Mar-2021 13:02
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike 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>Matrix Spike (MS) Recoveries</b>								
TCLP Metals	VA21A4933-001	BA2111-A-1	barium, TCLP	7440-39-3	E444	21.2 %	50.0-140%	Recovery less than lower data quality objective



## 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 BA2111-A-1	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-10	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-11	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-12	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-2	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-3	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-4	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✓	23-Mar-2021	14 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 BA2111-A-5	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✔	23-Mar-2021	14 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-6	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✔	23-Mar-2021	14 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-7	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✔	23-Mar-2021	14 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-8	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✔	23-Mar-2021	14 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2111-A-9	E510	10-Mar-2021	23-Mar-2021	28 days	13 days	✔	23-Mar-2021	14 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2111-A-1	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2111-A-10	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2111-A-11	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2111-A-12	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 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 : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-2	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-3	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-4	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-5	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-6	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-7	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-8	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2111-A-9	E440	10-Mar-2021	23-Mar-2021	180 days	13 days	✔	23-Mar-2021	166 days	0 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2111-A-1	E144	10-Mar-2021	----	----	----		22-Mar-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		
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-10	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-11	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-12	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-2	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-3	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-4	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-5	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-6	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2111-A-7	E144	10-Mar-2021	----	----	----		22-Mar-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 BA2111-A-8	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2111-A-9	E144	10-Mar-2021	----	----	----		22-Mar-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-1	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-10	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-11	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-12	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-2	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-3	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-4	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 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 BA2111-A-5	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-6	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-7	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-8	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2111-A-9	E108	10-Mar-2021	23-Mar-2021	30 days	13 days	✔	23-Mar-2021	16 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-1	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-10	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-11	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-12	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 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 : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-2	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-3	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-4	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-5	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-6	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-7	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-8	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-9	E512	20-Mar-2021	----	----	----		22-Mar-2021	37 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-1	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 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) BA2111-A-10	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-11	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-12	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-2	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-3	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-4	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-5	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-6	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2111-A-7	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 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> BA2111-A-8	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 days	11 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2111-A-9	E444	20-Mar-2021	----	----	----		22-Mar-2021	189 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> BA2111-A-1	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-10	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-11	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-12	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-2	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-3	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-4	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-5	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-6	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-7	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-8	EPP444	10-Mar-2021	20-Mar-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> BA2111-A-9	EPP444	10-Mar-2021	20-Mar-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	167416	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	167417	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	167419	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	167418	1	20	5.0	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	167416	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	167417	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	167419	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	167418	1	20	5.0	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	166968	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	167416	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	166969	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	167417	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	167419	1	20	5.0	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	166968	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	166969	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.

Page : 16 of 16  
Work Order : VA21A4933  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 : VA21A4933

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 : 17-Mar-2021 10:50
Date Analysis Commenced : 20-Mar-2021
Issue Date : 25-Mar-2021 13:02

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), Dee Lee (Analyst), Ophelia Chiu (Department Manager - Organics), and Owen Cheng (Metals).

Page : 2 of 11  
Work Order : VA21A4933  
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: 167418)</b>											
VA21A4926-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.32	6.24	1.27%	5%	----
<b>Physical Tests (QC Lot: 167419)</b>											
VA21A4926-001	Anonymous	moisture	----	E144	0.25	%	26.9	26.3	2.17%	20%	----
<b>Metals (QC Lot: 167416)</b>											
VA21A4926-001	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	1.16	1.26	7.83%	40%	----
<b>Metals (QC Lot: 167417)</b>											
VA21A4926-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	4760	4240	11.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	2.39	2.23	7.04%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	1.29	1.18	8.87%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	118	106	10.4%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	32.2	31.1	3.34%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	11.0	10.8	0.2	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	1.37	1.33	3.24%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	10600	10300	2.46%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	19.8	17.8	11.0%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	2.42	2.24	7.78%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	738	726	1.56%	30%	----
		iron	7439-89-6	E440	50	mg/kg	5850	5040	14.8%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	23.1	23.9	3.25%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	2280	1970	14.6%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	117	107	8.66%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	4.91	4.69	4.53%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	12.0	11.3	5.78%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	13700	13200	4.01%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	2220	2230	0.284%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	3.29	2.95	10.7%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	3.09	2.66	15.3%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	641	635	0.986%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	37.8	36.3	4.08%	40%	----

Page : 4 of 11  
 Work Order : VA21A4933  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

*Laboratory Duplicate (DUP) Report*

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
<b>Metals (QC Lot: 167417) - continued</b>											
VA21A4926-001	Anonymous	sulfur	7704-34-9	E440	1000	mg/kg	6500	6500	40	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	19.9	18.7	6.01%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	155	131	17.1%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	0.68	0.69	0.01	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.346	0.336	2.76%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	12.4	10.6	15.3%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	630	618	1.91%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	32.4	30.8	4.88%	30%	----





## 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: 167419)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 167416)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 167417)</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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 167417) - continued</b>						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
<b>TCLP Metals (QCLot: 166968)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 166969)</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: 167418)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
<b>Physical Tests (QCLot: 167419)</b>									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
<b>Metals (QCLot: 167416)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	80.0	120	----
<b>Metals (QCLot: 167417)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	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	101	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	109	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.5	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.2	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	103	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	105	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.1	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	113	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	109	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	108	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	94.4	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	115	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.2	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	106	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	111	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Metals (QCLot: 167417) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.9	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	116	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	97.2	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: 166968)</b>										
VA21A4933-001	BA2111-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----
<b>TCLP Metals (QCLot: 166969)</b>										
VA21A4933-001	BA2111-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	4.8 mg/L	5 mg/L	96.1	50.0	140	----
		barium, TCLP	7440-39-3	E444	2.6 mg/L	12.5 mg/L	21.2	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.245 mg/L	0.25 mg/L	97.9	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.68 mg/L	10 mg/L	86.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.266 mg/L	0.25 mg/L	106	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	1.17 mg/L	1.25 mg/L	93.5	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	2.18 mg/L	2.5 mg/L	87.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	233 mg/L	250 mg/L	93.2	50.0	140	----
		lead, TCLP	7439-92-1	E444	5.74 mg/L	10 mg/L	57.4	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	215 mg/L	250 mg/L	86.0	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.23 mg/L	2.5 mg/L	89.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.23 mg/L	5 mg/L	105	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.114 mg/L	0.1 mg/L	114	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	93.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.91 mg/L	5 mg/L	98.3	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.2	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	87.2	70.0	130	----



## 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: 167416)</b>									
QC-167416-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	97.0	70.0	130	----
<b>Metals (QCLot: 167417)</b>									
QC-167417-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	116	70.0	130	----
QC-167417-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	96.2	70.0	130	----
QC-167417-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
QC-167417-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	95.8	70.0	130	----
QC-167417-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
QC-167417-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	130	40.0	160	----
QC-167417-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	94.8	70.0	130	----
QC-167417-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
QC-167417-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
QC-167417-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-167417-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-167417-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
QC-167417-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	101	70.0	130	----
QC-167417-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	110	70.0	130	----
QC-167417-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	----
QC-167417-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
QC-167417-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
QC-167417-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
QC-167417-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	107	70.0	130	----
QC-167417-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	113	70.0	130	----
QC-167417-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	106	70.0	130	----
QC-167417-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
QC-167417-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	104	40.0	160	----
QC-167417-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	98.5	70.0	130	----
QC-167417-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	122	70.0	130	----
QC-167417-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
QC-167417-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A4933  
 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: 167417) - continued</b>									
QC-167417-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
QC-167417-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	100	70.0	130	----

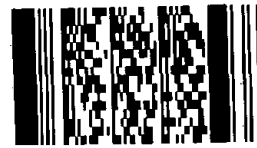


<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested (Rush for routine analysis subject to availability)</b>		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business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

Lab Work Order # (lab use only)		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	BA2111-A-1			Soil	X	X		X					1
2	BA2111-A-2			Soil	X	X		X					1
3	BA2111-A-3			Soil	X	X		X					1
4	BA2111-A-4			Soil	X	X		X					1
5	BA2111-A-5			Soil	X	X		X					1
6	BA2111-A-6			Soil	X	X		X					1
7	BA2111-A-7			Soil	X	X		X					1
8	BA2111-A-8			Soil	X	X		X					1
9	BA2111-A-9			Soil	X	X		X					1
10	BA2111-A-10			Soil	X	X		X					1
11	BA2111-A-11			Soil	X	X		X					1
12	BA2111-A-12			Soil	X	X		X					1

Environmental Division  
 Vancouver  
 Work Order Reference  
**VA21A4933**



Telephone : +1 604 253 4188

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
[Signature]	10-Mar-21	0800	JA	17/03/2021	10:50	19 °C				