

## Bottom Ash Data

2021 Week 45

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The following analytical report represents bottom ash composite results for week 45 of 2021 (October 31, 2021 to November 6, 2021).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA21C5040**  
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 : 09-Nov-2021 11:50  
Date Analysis Commenced : 14-Nov-2021  
Issue Date : 22-Nov-2021 10:13

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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, 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	BA2145-A-1	BA2145-A-2	BA2145-A-3	BA2145-A-4	BA2145-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-001	VA21C5040-002	VA21C5040-003	VA21C5040-004	VA21C5040-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	24.2	24.6	24.9	23.6	23.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	11.1	11.0	11.1	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	49300	61100	52300	37600	35200	
antimony	7440-36-0	E440	0.10	mg/kg	132	205	78.0	120	111	
arsenic	7440-38-2	E440	0.10	mg/kg	16.4	11.9	16.2	25.5	17.3	
barium	7440-39-3	E440	0.50	mg/kg	687	716	610	588	628	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.54	0.37	0.43	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	201	8.08	9.50	19.6	15.5	
boron	7440-42-8	E440	5.0	mg/kg	300	489	160	182	162	
cadmium	7440-43-9	E440	0.020	mg/kg	21.7	9.84	8.83	12.8	11.5	
calcium	7440-70-2	E440	50	mg/kg	147000	121000	137000	154000	146000	
chromium	7440-47-3	E440	0.50	mg/kg	260	131	164	240	237	
cobalt	7440-48-4	E440	0.10	mg/kg	152	122	37.1	70.5	61.1	
copper	7440-50-8	E440	0.50	mg/kg	2180	11400	3210	3720	8420	
iron	7439-89-6	E440	50	mg/kg	54500	93900	59900	77100	76900	
lead	7439-92-1	E440	0.50	mg/kg	1690	453	507	807	873	
lithium	7439-93-2	E440	2.0	mg/kg	22.1	46.2	22.3	26.9	26.0	
magnesium	7439-95-4	E440	20	mg/kg	13200	10800	12600	13100	12300	
manganese	7439-96-5	E440	1.0	mg/kg	1010	914	810	1210	1060	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0512	0.0589	0.0769	0.308	
molybdenum	7439-98-7	E440	0.10	mg/kg	25.8	27.3	42.3	63.1	37.1	
nickel	7440-02-0	E440	0.50	mg/kg	203	188	280	200	263	
phosphorus	7723-14-0	E440	50	mg/kg	15600	9510	11300	14100	12300	
potassium	7440-09-7	E440	100	mg/kg	4620	4190	4100	4680	4460	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.23	0.39	0.44	0.39	
silver	7440-22-4	E440	0.10	mg/kg	12.5	3.21	3.92	7.60	4.99	
sodium	7440-23-5	E440	50	mg/kg	14900	13600	13400	14400	14500	
strontium	7440-24-6	E440	0.50	mg/kg	418	292	558	418	790	
sulfur	7704-34-9	E440	1000	mg/kg	10200	7100	9200	12800	11400	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2145-A-1	BA2145-A-2	BA2145-A-3	BA2145-A-4	BA2145-A-5
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-001	VA21C5040-002	VA21C5040-003	VA21C5040-004	VA21C5040-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.057	0.079	0.097	0.093	
tin	7440-31-5	E440	2.0	mg/kg	675	151	100	133	130	
titanium	7440-32-6	E440	1.0	mg/kg	526	1200	603	354	370	
tungsten	7440-33-7	E440	0.50	mg/kg	12.9	10.4	10.2	18.3	18.9	
uranium	7440-61-1	E440	0.050	mg/kg	5.28	4.15	4.96	6.83	6.18	
vanadium	7440-62-2	E440	0.20	mg/kg	203	43.8	48.4	60.9	56.2	
zinc	7440-66-6	E440	2.0	mg/kg	3240	2630	6290	4190	3430	
zirconium	7440-67-7	E440	1.0	mg/kg	2.5	4.0	3.0	2.4	1.8	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.7	11.7	11.8	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.16	8.96	9.09	8.94	9.05	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.31	6.37	5.85	5.77	6.35	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.91	2.36	2.05	2.04	2.00	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.148	0.147	0.212	0.177	0.166	
calcium, TCLP	7440-70-2	E444	10	mg/L	2080	1970	2180	2170	2100	
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	0.615	0.836	0.792	1.95	0.676	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.02	1.02	1.20	0.988	1.09	
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	0.45	0.92	0.55	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	139	130	138	143	136	
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	0.54	0.54	0.64	0.65	0.56	
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	BA2145-A-1	BA2145-A-2	BA2145-A-3	BA2145-A-4	BA2145-A-5
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-001	VA21C5040-002	VA21C5040-003	VA21C5040-004	VA21C5040-005	
					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	39.3	25.6	56.3	68.1	27.2	
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	BA2145-A-6	BA2145-A-7	BA2145-A-8	BA2145-A-9	BA2145-A-10
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-006	VA21C5040-007	VA21C5040-008	VA21C5040-009	VA21C5040-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	25.1	22.4	23.4	24.0	25.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	11.3	11.1	11.2	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	47200	36000	36400	40700	40800	
antimony	7440-36-0	E440	0.10	mg/kg	96.2	109	101	113	99.9	
arsenic	7440-38-2	E440	0.10	mg/kg	15.6	18.0	16.6	19.5	21.8	
barium	7440-39-3	E440	0.50	mg/kg	743	617	635	506	616	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.37	0.37	0.43	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	27.6	16.1	29.8	49.0	17.6	
boron	7440-42-8	E440	5.0	mg/kg	191	165	190	225	242	
cadmium	7440-43-9	E440	0.020	mg/kg	9.63	11.1	14.1	13.0	16.3	
calcium	7440-70-2	E440	50	mg/kg	129000	138000	146000	137000	141000	
chromium	7440-47-3	E440	0.50	mg/kg	136	200	165	306	168	
cobalt	7440-48-4	E440	0.10	mg/kg	78.0	53.3	61.9	401	43.2	
copper	7440-50-8	E440	0.50	mg/kg	2090	4530	2050	8670	3780	
iron	7439-89-6	E440	50	mg/kg	83500	79200	81000	107000	50800	
lead	7439-92-1	E440	0.50	mg/kg	2420	760	1750	1750	768	
lithium	7439-93-2	E440	2.0	mg/kg	30.7	22.5	22.9	25.4	21.2	
magnesium	7439-95-4	E440	20	mg/kg	11000	11500	12100	11300	11800	
manganese	7439-96-5	E440	1.0	mg/kg	1000	1020	1020	1120	793	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0855	0.0661	0.0556	<0.0500	0.140	
molybdenum	7439-98-7	E440	0.10	mg/kg	31.9	30.0	45.5	34.1	32.1	
nickel	7440-02-0	E440	0.50	mg/kg	226	271	142	232	151	
phosphorus	7723-14-0	E440	50	mg/kg	10800	12900	13300	12100	11800	
potassium	7440-09-7	E440	100	mg/kg	4080	4550	4510	4240	4410	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.26	0.43	0.28	0.36	
silver	7440-22-4	E440	0.10	mg/kg	5.41	6.97	9.87	4.73	10.4	
sodium	7440-23-5	E440	50	mg/kg	13000	14600	15200	13600	15000	
strontium	7440-24-6	E440	0.50	mg/kg	322	334	703	438	413	
sulfur	7704-34-9	E440	1000	mg/kg	8500	11500	11100	11700	10300	
thallium	7440-28-0	E440	0.050	mg/kg	0.080	0.082	0.079	0.196	0.080	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2145-A-6	BA2145-A-7	BA2145-A-8	BA2145-A-9	BA2145-A-10
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-006	VA21C5040-007	VA21C5040-008	VA21C5040-009	VA21C5040-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	87.0	146	159	184	182	
titanium	7440-32-6	E440	1.0	mg/kg	669	347	371	365	528	
tungsten	7440-33-7	E440	0.50	mg/kg	12.2	17.2	15.6	15.5	15.4	
uranium	7440-61-1	E440	0.050	mg/kg	4.69	5.73	6.00	5.88	5.59	
vanadium	7440-62-2	E440	0.20	mg/kg	47.9	51.4	55.6	54.8	52.8	
zinc	7440-66-6	E440	2.0	mg/kg	12900	4480	4080	13400	4520	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.1	2.8	2.9	2.6	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.07	9.62	9.49	9.56	9.99	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.26	6.09	5.63	5.56	6.36	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.87	2.10	2.12	2.20	1.93	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.186	0.152	0.295	0.186	0.231	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	2100	2260	2220	1920	
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	0.700	1.24	1.68	1.14	1.45	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.12	0.915	1.13	1.01	0.733	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	5.8	8.1	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	1.17	<0.25	0.48	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	145	145	152	144	127	
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	0.55	0.55	0.98	0.67	0.68	
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	BA2145-A-6	BA2145-A-7	BA2145-A-8	BA2145-A-9	BA2145-A-10
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00	03-Nov-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-006	VA21C5040-007	VA21C5040-008	VA21C5040-009	VA21C5040-010	
					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	42.7	35.8	58.9	48.3	24.2	
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	BA2145-A-11	BA2145-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	03-Nov-2021 09:00	03-Nov-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-011	VA21C5040-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	24.7	25.7	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	38300	36200	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	97.8	93.8	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	16.9	16.4	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	489	532	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.36	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	15.5	20.9	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	173	140	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	10.5	10.8	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	142000	133000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	157	281	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	73.6	93.5	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2040	5090	----	----	----	
iron	7439-89-6	E440	50	mg/kg	70600	81300	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	680	665	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	22.7	22.1	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11400	11500	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	985	964	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0505	0.0516	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	31.1	44.1	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	110	256	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	12500	11400	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4520	4160	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.27	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	6.68	7.19	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14000	12700	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	361	463	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	11300	10400	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.078	0.080	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2145-A-11	BA2145-A-12	----	----	----
Client sampling date / time					03-Nov-2021 09:00	03-Nov-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-011	VA21C5040-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	124	150	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	305	251	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	14.3	77.7	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.88	5.22	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	56.1	49.6	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4110	6720	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	3.2	3.1	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.76	10.1	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.31	6.44	----	----	----	
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	1.99	1.97	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.131	0.121	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2070	2010	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.23	0.552	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.985	0.788	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.40	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	134	138	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.41	0.43	----	----	----	
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	BA2145-A-11	BA2145-A-12	----	----	----
					Client sampling date / time	03-Nov-2021 09:00	03-Nov-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C5040-011	VA21C5040-012	-----	-----	-----	
					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	31.6	24.0	----	----	----	
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>VA21C5040</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	: 09-Nov-2021 11:50
PO	: VANCO 0000050390	Issue Date	: 22-Nov-2021 10:13
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	VA21C5040-001	BA2145-A-1	bismuth	7440-69-9	E440	180 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	boron	7440-42-8	E440	33.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	cadmium	7440-43-9	E440	101 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	chromium	7440-47-3	E440	49.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	cobalt	7440-48-4	E440	118 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	copper	7440-50-8	E440	55.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	iron	7439-89-6	E440	58.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	lead	7439-92-1	E440	119 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	lithium	7439-93-2	E440	50.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	phosphorus	7723-14-0	E440	37.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	silver	7440-22-4	E440	116 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	tin	7440-31-5	E440	102 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5040-001	BA2145-A-1	vanadium	7440-62-2	E440	126 % 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 BA2145-A-1	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-10	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-11	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-12	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-2	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-3	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2145-A-4	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 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>											
<b>LDPE bag</b> BA2145-A-5	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2145-A-6	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2145-A-7	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2145-A-8	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2145-A-9	E510	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	28 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2145-A-1	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2145-A-10	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2145-A-11	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2145-A-12	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 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 BA2145-A-2	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-3	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-4	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-5	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-6	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-7	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-8	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2145-A-9	E440	03-Nov-2021	18-Nov-2021	----	----		19-Nov-2021	180 days	16 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2145-A-1	E144	03-Nov-2021	----	----	----		17-Nov-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 BA2145-A-10	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-11	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-12	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-2	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-3	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-4	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-5	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-6	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2145-A-7	E144	03-Nov-2021	----	----	----		17-Nov-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 BA2145-A-8	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2145-A-9	E144	03-Nov-2021	----	----	----		17-Nov-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-1	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-10	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-11	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-12	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-2	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-3	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-4	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 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>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-5	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-6	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-7	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-8	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2145-A-9	E108	03-Nov-2021	18-Nov-2021	----	----		18-Nov-2021	30 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-1	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-10	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-11	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-12	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 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) BA2145-A-2	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-3	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-4	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-5	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-6	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-7	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-8	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-9	E512	14-Nov-2021	----	----	----		19-Nov-2021	----	16 days	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2145-A-1	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 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) BA2145-A-10	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-11	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-12	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-2	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-3	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-4	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-5	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-6	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2145-A-7	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 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> BA2145-A-8	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2145-A-9	E444	14-Nov-2021	----	----	----		19-Nov-2021	180 days	17 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> BA2145-A-1	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-10	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-11	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-12	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-2	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-3	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-4	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-5	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-6	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-7	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-8	EPP444	03-Nov-2021	14-Nov-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> BA2145-A-9	EPP444	03-Nov-2021	14-Nov-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	347231	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	347230	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	347233	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	347232	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	347231	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	347230	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	347233	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	347232	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	346713	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	347231	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	346714	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	347230	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	347233	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	346713	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	346714	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 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$ ) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
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 $\text{HNO}_3$ and $\text{HCl}$ . This method is intended to liberate metals that may be environmentally available.

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Work Order : VA21C5040  
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 : **VA21C5040**

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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 : 09-Nov-2021 11:50  
Date Analysis Commenced : 14-Nov-2021  
Issue Date : 22-Nov-2021 10:13

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.

Signatories	Position	Laboratory Department
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

Page : 2 of 11  
Work Order : VA21C5040  
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: 347232)</b>											
VA21C5040-001	BA2145-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.0	1.3%	5%	----
<b>Physical Tests (QC Lot: 347233)</b>											
VA21C5040-001	BA2145-A-1	moisture	----	E144	0.25	%	24.2	24.2	0.172%	20%	----
<b>Metals (QC Lot: 347230)</b>											
VA21C5040-001	BA2145-A-1	aluminum	7429-90-5	E440	50	mg/kg	49300	43300	13.0%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	132	102	25.1%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	16.4	16.8	2.41%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	687	845	20.6%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.37	0.05	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	201	10.5	180%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	300	213	33.6%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	21.7	7.13	101%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	147000	130000	12.6%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	260	158	49.2%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	152	39.2	118%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2180	3860	55.5%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	54500	99100	58.0%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	1690	427	119%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.1	36.9	50.2%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	13200	10600	21.9%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1010	993	1.70%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	25.8	23.6	9.04%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	203	177	13.4%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	15600	10700	37.4%	30%	DUP-H
		potassium	7440-09-7	E440	100	mg/kg	4620	4290	7.44%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.31	0.05	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	12.5	3.31	116%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	14900	14700	1.65%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	418	328	24.1%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	10200	7600	28.8%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.066	0.009	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: 347230) - continued</b>											
VA21C5040-001	BA2145-A-1	tin	7440-31-5	E440	2.0	mg/kg	675	220	102%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	526	736	33.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	12.9	11.7	9.65%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.28	4.40	18.1%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	203	46.1	126%	30%	DUP-H
		zinc	7440-66-6	E440	2.0	mg/kg	3240	2820	14.0%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.5	2.1	0.4	Diff <2x LOR	----
<b>Metals (QC Lot: 347231)</b>											
VA21C5040-001	BA2145-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	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: 347233)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 347230)</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: 347230) - 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: 347231)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
<b>TCLP Metals (QCLot: 346713)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
<b>TCLP Metals (QCLot: 346714)</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: 347232)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
<b>Physical Tests (QCLot: 347233)</b>									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
<b>Metals (QCLot: 347230)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	95.8	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	111	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	97.2	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.9	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.2	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.4	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.5	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.8	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.4	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.4	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.1	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.2	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.4	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	99.2	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.9	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.0	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.9	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.9	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.4	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.7	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: 347230) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.5	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.9	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
<b>Metals (QCLot: 347231)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	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: 346713)</b>										
VA21C5040-001	BA2145-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.2	50.0	140	----
<b>TCLP Metals (QCLot: 346714)</b>										
VA21C5040-001	BA2145-A-1	antimony, TCLP	7440-36-0	E444	5.9 mg/L	5 mg/L	118	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.2 mg/L	12.5 mg/L	106	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.251 mg/L	0.25 mg/L	100	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.2 mg/L	10 mg/L	102	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	1.27 mg/L	1.25 mg/L	102	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	2.44 mg/L	2.5 mg/L	97.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	252 mg/L	250 mg/L	101	50.0	140	----
		lead, TCLP	7439-92-1	E444	11.0 mg/L	10 mg/L	110	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	262 mg/L	250 mg/L	105	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.59 mg/L	2.5 mg/L	103	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.31 mg/L	5 mg/L	106	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.115 mg/L	0.1 mg/L	115	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.3 mg/L	5 mg/L	107	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.41 mg/L	5 mg/L	108	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.80 mg/L	0.75 mg/L	106	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	10 mg/L	10 mg/L	102	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: 347230)</b>									
QC-347230-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	98.8	70.0	130	----
QC-347230-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
QC-347230-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	99.6	70.0	130	----
QC-347230-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	96.1	70.0	130	----
QC-347230-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
QC-347230-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	116	40.0	160	----
QC-347230-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	91.4	70.0	130	----
QC-347230-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
QC-347230-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
QC-347230-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
QC-347230-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
QC-347230-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	99.6	70.0	130	----
QC-347230-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
QC-347230-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	107	70.0	130	----
QC-347230-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	102	70.0	130	----
QC-347230-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	102	70.0	130	----
QC-347230-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	105	70.0	130	----
QC-347230-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	98.5	70.0	130	----
QC-347230-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	101	70.0	130	----
QC-347230-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
QC-347230-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	100	70.0	130	----
QC-347230-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	102	70.0	130	----
QC-347230-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	102	40.0	160	----
QC-347230-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.3	70.0	130	----
QC-347230-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----
QC-347230-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	104	70.0	130	----
QC-347230-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----
QC-347230-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	99.0	70.0	130	----
QC-347230-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	102	70.0	130	----

Page : 11 of 11  
 Work Order : VA21C5040  
 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: 347231)</b>									
QC-347231-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.7	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # \_\_\_\_\_

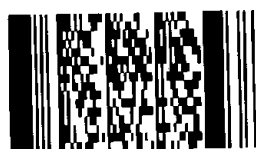
Page \_\_\_\_ of \_\_\_\_

<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)		
Contact:	Steve Mckinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
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:	dskrypnik@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@metrovancover.org		<b>Analysis Request</b>	
			Sarah.Wellman@metrovancover.org			

<b>Invoice To</b>		<b>Client / Project Information</b>		Please indicate below Filtered, Preserved or both (F, P, F/P)					
Same as Report ? <input type="checkbox"/> Yes <input type="checkbox"/> No		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)				
BA2145-A-1		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-2		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-3		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-4		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-5		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-6		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-7		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-8		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-9		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-10		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-11		03-Nov-21	9:00	Soil	X	X		X			1	
BA2145-A-12		03-Nov-21	9:00	Soil	X	X		X			1	

Environmental Division  
Vancouver  
Work Order Reference  
**VA21C5040**



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.

<b>SHIPMENT RELEASE (client use)</b>			<b>SHIPMENT RECEPTION (lab use only)</b>			<b>SHIPMENT VERIFICATION (lab use only)</b>				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
Kel	08/11/21	2pm	JA	9/11/2021	1150am	20 °C				Yes / No ? If Yes add SIF