

## Bottom Ash Data

2021 Week 44

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The following analytical report represents bottom ash composite results for week 44 of 2021 (October 24, 2021 to October 30, 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** : **VA21C4339**  
**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** : 01-Nov-2021 11:20  
**Date Analysis Commenced** : 04-Nov-2021  
**Issue Date** : 11-Nov-2021 18:15

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
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



## General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2144A-1	BA2144A-2	BA2144A-3	BA2144A-4	BA2144A-5
(Matrix: Soil/Solid)					Client sampling date / time	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-001	VA21C4339-002	VA21C4339-003	VA21C4339-004	VA21C4339-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.3	26.1	23.9	25.1	24.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.8	10.8	11.0	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	34800	45200	44800	36400	45300	
antimony	7440-36-0	E440	0.10	mg/kg	159	128	123	112	114	
arsenic	7440-38-2	E440	0.10	mg/kg	27.3	26.9	21.7	23.6	23.2	
barium	7440-39-3	E440	0.50	mg/kg	616	597	607	522	532	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.38	0.34	0.33	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	15.4	91.0	11.7	12.0	13.4	
boron	7440-42-8	E440	5.0	mg/kg	136	190	151	203	119	
cadmium	7440-43-9	E440	0.020	mg/kg	11.9	19.9	15.0	13.0	10.2	
calcium	7440-70-2	E440	50	mg/kg	140000	148000	125000	131000	127000	
chromium	7440-47-3	E440	0.50	mg/kg	199	153	197	131	131	
cobalt	7440-48-4	E440	0.10	mg/kg	872	97.6	28.1	34.6	172	
copper	7440-50-8	E440	0.50	mg/kg	2840	2190	6140	2690	7250	
iron	7439-89-6	E440	50	mg/kg	67700	52500	56900	51300	57200	
lead	7439-92-1	E440	0.50	mg/kg	390	389	609	442	491	
lithium	7439-93-2	E440	2.0	mg/kg	67.0	28.7	22.2	26.1	25.8	
magnesium	7439-95-4	E440	20	mg/kg	12700	13600	12000	12400	12600	
manganese	7439-96-5	E440	1.0	mg/kg	964	892	856	780	945	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0537	0.0555	0.0543	<0.0500	0.236	
molybdenum	7439-98-7	E440	0.10	mg/kg	73.9	76.0	63.8	64.8	64.3	
nickel	7440-02-0	E440	0.50	mg/kg	219	142	142	94.2	104	
phosphorus	7723-14-0	E440	50	mg/kg	13700	15000	12600	12900	12800	
potassium	7440-09-7	E440	100	mg/kg	6170	6180	5580	5300	5820	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.34	0.33	0.32	0.31	
silver	7440-22-4	E440	0.10	mg/kg	10.3	6.63	5.10	11.2	12.5	
sodium	7440-23-5	E440	50	mg/kg	16700	16900	16200	15000	16700	
strontium	7440-24-6	E440	0.50	mg/kg	436	339	311	554	472	
sulfur	7704-34-9	E440	1000	mg/kg	13600	14700	12000	12000	14100	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2144A-1	BA2144A-2	BA2144A-3	BA2144A-4	BA2144A-5
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-001	VA21C4339-002	VA21C4339-003	VA21C4339-004	VA21C4339-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.081	0.064	0.064	0.064	
tin	7440-31-5	E440	2.0	mg/kg	435	112	137	228	240	
titanium	7440-32-6	E440	1.0	mg/kg	357	448	540	489	699	
tungsten	7440-33-7	E440	0.50	mg/kg	19.0	15.4	19.1	17.0	18.9	
uranium	7440-61-1	E440	0.050	mg/kg	5.31	5.26	4.44	4.55	5.25	
vanadium	7440-62-2	E440	0.20	mg/kg	59.7	58.4	52.0	48.8	55.1	
zinc	7440-66-6	E440	2.0	mg/kg	6640	5620	4080	5280	3820	
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	2.3	2.3	2.1	2.1	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.3	11.2	11.3	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.33	9.30	9.75	9.88	9.48	
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	6.71	6.54	6.27	6.36	6.49	
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	1.99	1.97	1.90	1.98	1.91	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	1.03	0.193	0.141	0.143	0.141	
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2130	2060	2160	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	1.06	0.934	1.29	0.840	0.877	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.10	1.01	1.10	0.854	1.40	
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	142	148	137	150	142	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	1.18	0.70	0.95	0.72	0.53	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
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	BA2144A-1	BA2144-A-2	BA2144-A-3	BA2144-A-4	BA2144-A-5
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-001	VA21C4339-002	VA21C4339-003	VA21C4339-004	VA21C4339-005	
					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	36.6	40.9	42.6	36.9	43.7	
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	BA2144-A-6	BA2144-A-7	BA2144-A-8	BA2144-A-9	BA2144-A-10
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-006	VA21C4339-007	VA21C4339-008	VA21C4339-009	VA21C4339-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	28.0	22.2	25.8	25.9	27.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	11.0	11.0	10.8	11.0	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	36800	38600	42900	43500	44100	
antimony	7440-36-0	E440	0.10	mg/kg	255	116	104	115	114	
arsenic	7440-38-2	E440	0.10	mg/kg	28.0	24.8	21.7	28.4	25.7	
barium	7440-39-3	E440	0.50	mg/kg	554	575	592	650	659	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.40	0.38	0.39	0.38	
bismuth	7440-69-9	E440	0.20	mg/kg	17.0	12.6	12.4	29.5	20.3	
boron	7440-42-8	E440	5.0	mg/kg	195	136	162	199	166	
cadmium	7440-43-9	E440	0.020	mg/kg	19.9	10.0	10.2	10.7	14.2	
calcium	7440-70-2	E440	50	mg/kg	139000	130000	133000	140000	130000	
chromium	7440-47-3	E440	0.50	mg/kg	158	143	176	162	149	
cobalt	7440-48-4	E440	0.10	mg/kg	395	26.3	46.0	192	148	
copper	7440-50-8	E440	0.50	mg/kg	2570	3060	2590	3020	4720	
iron	7439-89-6	E440	50	mg/kg	53900	53300	59800	55200	63000	
lead	7439-92-1	E440	0.50	mg/kg	464	388	366	392	752	
lithium	7439-93-2	E440	2.0	mg/kg	89.7	21.2	24.8	26.9	22.8	
magnesium	7439-95-4	E440	20	mg/kg	13400	12000	13200	13600	12400	
manganese	7439-96-5	E440	1.0	mg/kg	1260	825	843	866	794	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0594	0.0546	<0.0500	0.855	
molybdenum	7439-98-7	E440	0.10	mg/kg	81.7	64.4	425	104	122	
nickel	7440-02-0	E440	0.50	mg/kg	929	127	152	213	345	
phosphorus	7723-14-0	E440	50	mg/kg	14800	14200	13700	16800	13700	
potassium	7440-09-7	E440	100	mg/kg	5880	5260	5440	6130	5450	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.37	0.35	0.50	0.33	
silver	7440-22-4	E440	0.10	mg/kg	8.93	5.71	8.60	6.24	5.60	
sodium	7440-23-5	E440	50	mg/kg	17200	15200	16400	17900	16600	
strontium	7440-24-6	E440	0.50	mg/kg	340	352	322	311	308	
sulfur	7704-34-9	E440	1000	mg/kg	13600	13200	13200	14400	12400	
thallium	7440-28-0	E440	0.050	mg/kg	0.064	0.070	0.070	0.071	0.061	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2144-A-6	BA2144-A-7	BA2144-A-8	BA2144-A-9	BA2144-A-10
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-006	VA21C4339-007	VA21C4339-008	VA21C4339-009	VA21C4339-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	1700	103	107	132	116	
titanium	7440-32-6	E440	1.0	mg/kg	398	603	561	508	563	
tungsten	7440-33-7	E440	0.50	mg/kg	19.9	18.2	21.0	19.1	14.6	
uranium	7440-61-1	E440	0.050	mg/kg	4.98	4.85	4.90	5.00	4.42	
vanadium	7440-62-2	E440	0.20	mg/kg	53.7	50.5	51.7	56.4	58.6	
zinc	7440-66-6	E440	2.0	mg/kg	4200	9430	3970	5430	4150	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	1.8	2.0	1.6	1.7	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.3	11.4	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.55	9.47	9.58	9.74	9.92	
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	6.44	6.33	6.33	6.28	6.24	
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	1.96	1.95	1.94	2.03	1.77	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.152	0.156	0.148	0.148	0.159	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2120	2220	2160	2060	
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	0.862	2.25	0.902	2.16	0.725	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.18	0.988	1.32	1.32	1.24	
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	150	152	162	152	144	
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	0.64	0.58	0.60	1.15	0.63	
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	BA2144-A-6	BA2144-A-7	BA2144-A-8	BA2144-A-9	BA2144-A-10
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00	27-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-006	VA21C4339-007	VA21C4339-008	VA21C4339-009	VA21C4339-010	
					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	31.4	31.1	46.8	54.2	59.7	
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	BA2144-A-11	BA2144-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	27-Oct-2021 09:00	27-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-011	VA21C4339-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	26.3	27.6	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.9	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	38900	43600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	124	119	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	24.6	26.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	608	557	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.33	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	13.4	15.8	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	143	170	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	19.7	11.4	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	136000	130000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	169	319	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	235	78.9	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	5660	4870	----	----	----	
iron	7439-89-6	E440	50	mg/kg	51400	62700	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	591	396	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	30.3	25.1	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	13000	13600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	759	868	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0660	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	78.6	70.4	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	235	218	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	13100	12300	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5620	5390	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.39	----	----	----	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	7.46	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	10.6	----	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17000	15800	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	328	291	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13700	12200	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2144-A-11	BA2144-A-12	----	----	----
Client sampling date / time					27-Oct-2021 09:00	27-Oct-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-011	VA21C4339-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.071	0.061	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	154	234	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	515	653	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	20.7	17.4	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.11	4.37	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	54.5	51.9	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4240	4520	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.9	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.67	9.77	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.28	6.37	----	----	----	
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	1.97	2.04	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.356	0.144	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2130	2130	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.858	1.03	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.33	1.04	----	----	----	
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	150	147	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.56	0.50	----	----	----	
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	----	----	----	



### Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2144-A-11	BA2144-A-12	----	----	----
					Client sampling date / time	27-Oct-2021 09:00	27-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C4339-011	VA21C4339-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>TCLP Metals</b>										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	41.5	36.8	----	----	----	
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>VA21C4339</b>	Page	: 1 of 14
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	: 01-Nov-2021 11:20
PO	: VANCO 0000050390	Issue Date	: 11-Nov-2021 18:15
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
- No Matrix Spike outliers occur.
- 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.



## 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 : High Silver in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2144-A-12	E440.Ag	27-Oct-2021	10-Nov-2021	----	----		10-Nov-2021	----	14 days		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144A-1	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144-A-10	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144-A-11	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144-A-12	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144-A-2	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2144-A-3	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 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 BA2144-A-4	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2144-A-5	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2144-A-6	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2144-A-7	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2144-A-8	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2144-A-9	E510	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	28 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2144A-1	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2144-A-10	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2144-A-11	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 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>											
<b>LDPE bag</b> BA2144-A-12	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-2	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-3	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-4	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-5	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-6	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-7	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-8	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
<b>LDPE bag</b> BA2144-A-9	E440	27-Oct-2021	05-Nov-2021	----	----		09-Nov-2021	180 days	13 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 : Moisture Content by Gravimetry</b>										
LDPE bag BA2144A-1	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-10	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-11	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-12	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-2	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-3	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-4	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-5	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2144-A-6	E144	27-Oct-2021	----	----	----		04-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 BA2144-A-7	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2144-A-8	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2144-A-9	E144	27-Oct-2021	----	----	----		04-Nov-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144A-1	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-10	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-11	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-12	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-2	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-3	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 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 BA2144-A-4	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-5	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-6	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-7	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-8	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2144-A-9	E108	27-Oct-2021	05-Nov-2021	----	----		05-Nov-2021	30 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2144A-1	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-10	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-11	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-12	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-2	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-3	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-4	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-5	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-6	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-7	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-8	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-9	E512	06-Nov-2021	----	----	----		09-Nov-2021	----	13 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) BA2144A-1	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-10	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-11	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-12	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-2	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-3	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-4	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-5	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2144-A-6	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 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) BA2144-A-7	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-8	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2144-A-9	E444	06-Nov-2021	----	----	----		09-Nov-2021	180 days	13 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144A-1	EPP444	27-Oct-2021	06-Nov-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144-A-10	EPP444	27-Oct-2021	06-Nov-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144-A-11	EPP444	27-Oct-2021	06-Nov-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144-A-12	EPP444	27-Oct-2021	06-Nov-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144-A-2	EPP444	27-Oct-2021	06-Nov-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2144-A-3	EPP444	27-Oct-2021	06-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> BA2144-A-4	EPP444	27-Oct-2021	06-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> BA2144-A-5	EPP444	27-Oct-2021	06-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> BA2144-A-6	EPP444	27-Oct-2021	06-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> BA2144-A-7	EPP444	27-Oct-2021	06-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> BA2144-A-8	EPP444	27-Oct-2021	06-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> BA2144-A-9	EPP444	27-Oct-2021	06-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	338152	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	338153	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	338155	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	338154	1	20	5.0	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	342373	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	338152	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	338153	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	338155	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	338154	1	20	5.0	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	342373	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	341399	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	338152	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	341400	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	338153	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	338155	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	341399	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	341400	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)	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 HNO <sub>3</sub> and 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are 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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
Digestion for Silver	EP440.Ag  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444  Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>VA21C4339</b>	<b>Page</b>	: 1 of 11
<b>Client</b>	: Covanta Burnaby Renewable Energy, ULC	<b>Laboratory</b>	: Vancouver - Environmental
<b>Contact</b>	: Steve McKinney	<b>Account Manager</b>	: Brent Mack
<b>Address</b>	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	<b>Address</b>	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
<b>Telephone</b>	: 604 521 1025	<b>Telephone</b>	: 778-370-3279
<b>Project</b>	: Weekly Bottom Ash - Suite	<b>Date Samples Received</b>	: 01-Nov-2021 11:20
<b>PO</b>	: VANCO 0000050390	<b>Date Analysis Commenced</b>	: 04-Nov-2021
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 11-Nov-2021 18:15
<b>Sampler</b>	: ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: Standing Offer (BC work)		
<b>No. of samples received</b>	: 12		
<b>No. of samples analysed</b>	: 12		

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative 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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

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Work Order : VA21C4339  
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: 338154)</b>											
VA21C2081-069	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.03	7.93	1.3%	5%	----
<b>Physical Tests (QC Lot: 338155)</b>											
VA21C4339-001	BA2144A-1	moisture	----	E144	0.25	%	23.3	25.5	8.99%	20%	----
<b>Metals (QC Lot: 338152)</b>											
VA21C2081-069	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 338153)</b>											
VA21C2081-069	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	15500	15500	0.201%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.32	0.32	0.005	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	6.43	6.97	8.04%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	86.0	79.0	8.48%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.46	0.47	0.010	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.131	0.120	0.011	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	8520	7910	7.36%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	27.2	28.3	3.78%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	14.2	16.4	14.7%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	242	240	0.974%	30%	----
		iron	7439-89-6	E440	50	mg/kg	31200	31400	0.764%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	4.77	4.78	0.0957%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	10.6	10.5	0.10	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	7570	7740	2.19%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	640	596	7.06%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	1.27	1.24	1.81%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	18.2	18.5	1.29%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	1330	1320	0.346%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	1210	1120	8.21%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	434	371	15.6%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	75.8	70.2	7.54%	40%	----

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 Work Order : VA21C4339  
 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: 338153) - continued</b>											
VA21C2081-069	Anonymous	sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.067	0.008	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	952	931	2.27%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.540	0.526	2.51%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	116	112	3.14%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	48.5	46.5	4.26%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	8.4	9.3	9.83%	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: 338155)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 338152)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 338153)</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: 338153) - 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>Metals (QCLot: 342373)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 341399)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 341400)</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: 338154)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
<b>Physical Tests (QCLot: 338155)</b>									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
<b>Metals (QCLot: 338152)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	107	80.0	120	----
<b>Metals (QCLot: 338153)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	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	103	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.9	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.6	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.7	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.4	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.4	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.9	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.0	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.8	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.9	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	110	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	97.7	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.1	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	91.1	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.3	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				Qualifier
					Spike Concentration	Recovery (%)	Recovery Limits (%)		
					LCS	Low	High		
<b>Metals (QCLot: 338153) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.8	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	94.7	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.1	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	94.9	80.0	120	----
<b>Metals (QCLot: 342373)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	89.0	80.0	120	----



### Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					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: 341399)</b>										
VA21C4339-001	BA2144A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	91.0	50.0	140	----
<b>TCLP Metals (QCLot: 341400)</b>										
VA21C4339-001	BA2144A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	98.8	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.8	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	9.13 mg/L	10 mg/L	91.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.19 mg/L	1.25 mg/L	95.2	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.29 mg/L	2.5 mg/L	91.7	50.0	140	----
		iron, TCLP	7439-89-6	E444	238 mg/L	250 mg/L	95.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.97 mg/L	10 mg/L	99.7	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	234 mg/L	250 mg/L	93.7	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.28 mg/L	2.5 mg/L	91.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.08 mg/L	5 mg/L	102	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.108 mg/L	0.1 mg/L	108	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	98.2	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.80 mg/L	5 mg/L	96.1	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.4	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	82.9	50.0	150	----



## Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
<b>Metals (QCLot: 338152)</b>									
QC-338152-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	95.7	70.0	130	----
<b>Metals (QCLot: 338153)</b>									
QC-338153-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	98.0	70.0	130	----
QC-338153-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	98.8	70.0	130	----
QC-338153-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	98.6	70.0	130	----
QC-338153-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	97.4	70.0	130	----
QC-338153-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	99.0	70.0	130	----
QC-338153-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	105	40.0	160	----
QC-338153-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	90.3	70.0	130	----
QC-338153-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	99.0	70.0	130	----
QC-338153-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	97.4	70.0	130	----
QC-338153-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	96.8	70.0	130	----
QC-338153-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	97.8	70.0	130	----
QC-338153-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	95.9	70.0	130	----
QC-338153-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	101	70.0	130	----
QC-338153-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	99.4	70.0	130	----
QC-338153-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	97.5	70.0	130	----
QC-338153-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	103	70.0	130	----
QC-338153-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
QC-338153-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	96.2	70.0	130	----
QC-338153-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	106	70.0	130	----
QC-338153-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	105	70.0	130	----
QC-338153-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	95.4	70.0	130	----
QC-338153-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
QC-338153-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	88.0	40.0	160	----
QC-338153-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	113	70.0	130	----
QC-338153-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----
QC-338153-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	92.1	70.0	130	----
QC-338153-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	99.3	70.0	130	----

Page : 11 of 11  
 Work Order : VA21C4339  
 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: 338153) - continued</b>									
QC-338153-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	97.9	70.0	130	----
QC-338153-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	89.6	70.0	130	----



<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypnyk	<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	Fax:	dskrypnyk@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 ?		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:					

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA2144-A-1	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-2	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-3	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-4	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-5	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-6	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-7	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-8	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-9	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-10	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-11	27-Oct-21	9:00	Soil	X	X		X	1
	BA2144-A-12	27-Oct-21	9:00	Soil	X	X		X	1

Environmental Division  
 Vancouver  
 Work Order Reference  
**VA21C4339**



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
KCL	01/NOV/21	10:10				15/14°C	JAV	NOV/21	11:20	