

## Bottom Ash Data

2022 Week 9

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The following analytical report represents bottom ash composite results for week 9 of 2022 (February 27, 2022 to March 5, 2022).

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** : **VA22A4775**  
**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 0000051213  
**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** : 08-Mar-2022 13:00  
**Date Analysis Commenced** : 09-Mar-2022  
**Issue Date** : 24-Mar-2022 16:52

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

**Signatories**

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia



## General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2209-A-1	BA2209-A-2	BA2209-A-3	BA2209-A-4	BA2209-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-001	VA22A4775-002	VA22A4775-003	VA22A4775-004	VA22A4775-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.7	23.4	22.6	24.9	23.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	10.5	10.6	10.7	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	32000	37900	42500	38900	40500	
antimony	7440-36-0	E440	0.10	mg/kg	117	98.5	145	91.4	107	
arsenic	7440-38-2	E440	0.10	mg/kg	17.8	16.8	21.6	19.2	22.6	
barium	7440-39-3	E440	0.50	mg/kg	362	472	476	461	685	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.45	0.53	0.50	0.43	
bismuth	7440-69-9	E440	0.20	mg/kg	9.40	17.4	16.9	16.7	10.4	
boron	7440-42-8	E440	5.0	mg/kg	232	206	217	191	211	
cadmium	7440-43-9	E440	0.020	mg/kg	18.6	8.67	16.1	11.3	10.8	
calcium	7440-70-2	E440	50	mg/kg	134000	137000	171000	144000	156000	
chromium	7440-47-3	E440	0.50	mg/kg	230	138	212	151	182	
cobalt	7440-48-4	E440	0.10	mg/kg	126	53.0	70.1	32.7	90.7	
copper	7440-50-8	E440	0.50	mg/kg	2780	2700	1970	3570	3520	
iron	7439-89-6	E440	50	mg/kg	51900	44400	56700	51000	70300	
lead	7439-92-1	E440	0.50	mg/kg	1970	398	370	372	2370	
lithium	7439-93-2	E440	2.0	mg/kg	38.7	41.4	41.7	35.5	66.0	
magnesium	7439-95-4	E440	20	mg/kg	12600	14900	14200	11700	14600	
manganese	7439-96-5	E440	1.0	mg/kg	980	763	855	739	843	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	54.9	32.2	55.0	40.2	40.5	
nickel	7440-02-0	E440	0.50	mg/kg	190	270	144	116	134	
phosphorus	7723-14-0	E440	50	mg/kg	12700	15600	14500	14300	14900	
potassium	7440-09-7	E440	100	mg/kg	5940	5930	7070	5920	6580	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.33	0.44	0.33	0.39	
silver	7440-22-4	E440	0.10	mg/kg	5.40	5.86	8.14	5.31	6.61	
sodium	7440-23-5	E440	50	mg/kg	17500	17700	20000	17200	20200	
strontium	7440-24-6	E440	0.50	mg/kg	282	302	357	304	360	
sulfur	7704-34-9	E440	1000	mg/kg	14500	13000	16600	14000	14400	
thallium	7440-28-0	E440	0.050	mg/kg	0.054	0.120	0.058	0.059	0.063	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-1	BA2209-A-2	BA2209-A-3	BA2209-A-4	BA2209-A-5
Client sampling date / time					08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-001	VA22A4775-002	VA22A4775-003	VA22A4775-004	VA22A4775-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	112	114	327	85.2	390	
titanium	7440-32-6	E440	1.0	mg/kg	195	232	251	214	268	
tungsten	7440-33-7	E440	0.50	mg/kg	11.9	12.4	21.1	12.4	10.1	
uranium	7440-61-1	E440	0.050	mg/kg	6.52	5.70	7.22	6.08	6.60	
vanadium	7440-62-2	E440	0.20	mg/kg	51.2	44.9	58.5	49.1	54.2	
zinc	7440-66-6	E440	2.0	mg/kg	4500	4870	5110	8010	4490	
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	2.4	1.9	2.4	3.2	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.4	11.4	11.3	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.28	9.36	8.23	8.50	9.30	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.50	6.41	6.37	6.69	6.67	
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	1.94	2.00	2.25	2.10	2.00	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.132	0.117	0.169	0.139	0.099	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2180	2430	2260	2170	
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	0.956	1.77	0.897	1.09	1.52	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.769	0.626	1.23	0.519	0.509	
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	132	146	171	141	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	0.50	0.56	0.55	0.45	0.49	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-1	BA2209-A-2	BA2209-A-3	BA2209-A-4	BA2209-A-5
Client sampling date / time					08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-001	VA22A4775-002	VA22A4775-003	VA22A4775-004	VA22A4775-005	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	23.5	23.3	36.9	20.6	19.2	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2209-A-6	BA2209-A-7	BA2209-A-8	BA2209-A-9	BA2209-A-10
(Matrix: Soil/Solid)					Client sampling date / time	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-006	VA22A4775-007	VA22A4775-008	VA22A4775-009	VA22A4775-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	25.0	25.2	22.8	24.1	21.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	10.6	10.6	10.6	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	43400	32800	28500	67200	46700	
antimony	7440-36-0	E440	0.10	mg/kg	123	129	105	121	111	
arsenic	7440-38-2	E440	0.10	mg/kg	21.3	24.5	18.7	16.8	18.0	
barium	7440-39-3	E440	0.50	mg/kg	560	445	562	522	479	
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.38	0.38	0.36	0.42	
bismuth	7440-69-9	E440	0.20	mg/kg	10.7	12.4	12.1	10.6	12.9	
boron	7440-42-8	E440	5.0	mg/kg	223	177	199	187	177	
cadmium	7440-43-9	E440	0.020	mg/kg	11.3	10.8	10.9	11.5	11.3	
calcium	7440-70-2	E440	50	mg/kg	158000	143000	134000	167000	152000	
chromium	7440-47-3	E440	0.50	mg/kg	376	159	175	254	215	
cobalt	7440-48-4	E440	0.10	mg/kg	45.1	56.7	324	30.2	47.2	
copper	7440-50-8	E440	0.50	mg/kg	25300	3090	1260	1490	1600	
iron	7439-89-6	E440	50	mg/kg	69000	60400	136000	67900	57500	
lead	7439-92-1	E440	0.50	mg/kg	14400	411	392	582	1000	
lithium	7439-93-2	E440	2.0	mg/kg	36.3	35.1	40.3	51.4	47.3	
magnesium	7439-95-4	E440	20	mg/kg	13700	13400	12900	12200	14800	
manganese	7439-96-5	E440	1.0	mg/kg	1150	880	1220	1030	1000	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	104	78.1	36.4	59.5	41.7	
nickel	7440-02-0	E440	0.50	mg/kg	309	173	113	166	338	
phosphorus	7723-14-0	E440	50	mg/kg	12600	11800	10800	14200	12600	
potassium	7440-09-7	E440	100	mg/kg	6500	6030	4930	5200	6110	
selenium	7782-49-2	E440	0.20	mg/kg	0.67	0.35	0.37	0.31	0.36	
silver	7440-22-4	E440	0.10	mg/kg	11.8	5.68	6.49	5.49	6.24	
sodium	7440-23-5	E440	50	mg/kg	18800	17600	16000	17500	19400	
strontium	7440-24-6	E440	0.50	mg/kg	353	312	272	306	403	
sulfur	7704-34-9	E440	1000	mg/kg	16200	14700	12600	15400	15100	
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.055	<0.050	0.054	0.059	
tin	7440-31-5	E440	2.0	mg/kg	558	166	132	178	238	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-6	BA2209-A-7	BA2209-A-8	BA2209-A-9	BA2209-A-10
Client sampling date / time					08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-006	VA22A4775-007	VA22A4775-008	VA22A4775-009	VA22A4775-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
titanium	7440-32-6	E440	1.0	mg/kg	274	215	216	493	328	
tungsten	7440-33-7	E440	0.50	mg/kg	13.6	15.9	12.3	11.2	12.8	
uranium	7440-61-1	E440	0.050	mg/kg	5.82	6.08	5.28	5.92	6.10	
vanadium	7440-62-2	E440	0.20	mg/kg	51.6	52.4	42.4	52.0	63.6	
zinc	7440-66-6	E440	2.0	mg/kg	5940	5190	2920	2790	5270	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.2	2.6	3.9	4.2	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.5	11.5	11.5	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.08	8.68	8.98	9.07	8.85	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.75	6.43	6.23	6.70	6.44	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.10	1.99	1.86	2.03	1.88	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.149	0.235	0.234	0.218	0.153	
calcium, TCLP	7440-70-2	E444	10	mg/L	2230	2170	2040	2290	2140	
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	0.820	1.50	0.932	0.993	2.00	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.557	0.676	1.02	0.564	0.731	
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	0.31	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	134	134	132	136	140	
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	0.44	0.47	0.75	0.38	0.40	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	13.9	26.8	30.2	20.7	29.2	





## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-6	BA2209-A-7	BA2209-A-8	BA2209-A-9	BA2209-A-10
Client sampling date / time					08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022	08-Mar-2022
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-006	VA22A4775-007	VA22A4775-008	VA22A4775-009	VA22A4775-010	
TCLP Metals					Result	Result	Result	Result	Result	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2209-A-11	BA2209-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	08-Mar-2022	08-Mar-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-011	VA22A4775-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.6	24.5	---	---	---	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	---	---	---	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	41200	38400	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	128	120	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	20.8	17.8	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	494	463	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.38	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	10.7	10.8	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	178	252	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	11.4	12.1	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	158000	142000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	182	154	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	472	105	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	2240	2290	---	---	---	
iron	7439-89-6	E440	50	mg/kg	68000	48700	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	434	428	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	52.3	44.1	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	13800	12900	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	935	1030	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	46.2	54.4	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	146	205	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	14800	11900	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	6380	5950	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.41	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	7.98	7.14	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	18400	17200	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	349	309	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	16000	14700	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.058	---	---	---	
tin	7440-31-5	E440	2.0	mg/kg	112	112	---	---	---	



**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-11	BA2209-A-12	----	----	----
Client sampling date / time					08-Mar-2022	08-Mar-2022	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-011	VA22A4775-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
titanium	7440-32-6	E440	1.0	mg/kg	269	306	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	21.2	14.2	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	7.03	6.37	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	51.6	49.8	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	6830	4220	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.6	1.1	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.4	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.69	9.17	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.32	6.59	----	----	----	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.00	2.04	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.430	0.148	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2230	2160	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.07	1.20	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.637	0.764	----	----	----	
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	146	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	0.66	0.54	----	----	----	
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	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	29.1	22.1	----	----	----	



**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2209-A-11	BA2209-A-12	----	----	----
Client sampling date / time					08-Mar-2022	08-Mar-2022	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22A4775-011	VA22A4775-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
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>VA22A4775</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	: 08-Mar-2022 13:00
PO	: VANCO 0000051213	Issue Date	: 24-Mar-2022 16:51
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.

### **Workorder Comments**

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

### **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 : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-1	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-10	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-11	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-12	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-2	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-3	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-4	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-5	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-6	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-7	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-8	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2209-A-9	E510	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	28 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2209-A-1	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2209-A-10	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2209-A-11	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2209-A-12	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	





Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-2	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-3	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-4	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-5	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-6	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-7	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-8	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2209-A-9	E440	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	180 days	15 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2209-A-1	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----		



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 BA2209-A-10	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-11	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-12	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-2	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-3	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-4	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-5	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-6	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-7	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	



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 BA2209-A-8	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2209-A-9	E144	08-Mar-2022	----	----	----		22-Mar-2022	----	----	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-1	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-10	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-11	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-12	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-2	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-3	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>										
LDPE bag BA2209-A-4	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	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 BA2209-A-5	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2209-A-6	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2209-A-7	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2209-A-8	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2209-A-9	E108	08-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	30 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2209-A-1	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2209-A-10	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2209-A-11	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2209-A-12	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-2	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-3	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-4	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-5	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-6	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-7	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-8	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2209-A-9	E512	09-Mar-2022	----	----	----		12-Mar-2022	28 days	5 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2209-A-1	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 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) BA2209-A-10	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-11	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-12	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-2	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-3	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-4	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-5	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-6	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2209-A-7	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 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> BA2209-A-8	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2209-A-9	E444	09-Mar-2022	----	----	----		13-Mar-2022	180 days	6 days	✓
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-1	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-10	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-11	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-12	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-2	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-3	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-4	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	



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: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-5	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-6	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-7	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-8	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2209-A-9	EPP444	08-Mar-2022	09-Mar-2022	----	----		----	----	----	

**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	439718	1	19	5.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	439717	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	439720	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	439719	1	20	5.0	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	439718	2	19	10.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	439717	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	439720	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	439719	1	20	5.0	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	430944	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	439718	1	19	5.2	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	430943	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	439717	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	439720	1	18	5.5	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	430944	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	430943	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.



<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

<b>Work Order</b>	: <b>VA22A4775</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>	: 08-Mar-2022 13:00
<b>PO</b>	: VANCO 0000051213	<b>Date Analysis Commenced</b>	: 09-Mar-2022
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 24-Mar-2022 16:51
<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>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia

Page : 2 of 11  
Work Order : VA22A4775  
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.

## **Workorder Comments**

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Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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### 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: 439719)</b>											
FJ2200599-018	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.69	8.68	0.1%	5%	----
<b>Physical Tests (QC Lot: 439720)</b>											
VA22A4775-001	BA2209-A-1	moisture	----	E144	0.25	%	22.7	23.2	2.00%	20%	----
<b>Metals (QC Lot: 439717)</b>											
FJ2200599-018	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	18800	17600	6.65%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.88	0.93	5.56%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	14.0	14.7	4.78%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	660	657	0.586%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	1.05	1.08	2.66%	30%	----
		bismuth	7440-69-9	E440	0.20	mg/kg	0.29	0.31	0.02	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	14.8	13.1	1.7	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.980	1.05	6.67%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	9340	9510	1.82%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	32.2	31.2	3.20%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	14.9	14.9	0.0818%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	35.5	38.0	6.87%	30%	----
		iron	7439-89-6	E440	50	mg/kg	31100	31200	0.286%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	16.8	17.4	3.62%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	24.6	25.0	1.84%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	6490	6560	0.986%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	428	456	6.50%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	2.89	2.99	3.53%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	47.5	47.4	0.138%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	1010	1110	9.47%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	3640	3380	7.27%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	1.42	1.36	4.39%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	0.30	0.30	0.004	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	700	721	2.94%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	94.4	97.8	3.46%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	4800	4600	200	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.218	0.213	0.005	Diff <2x LOR	----

Page : 4 of 11  
 Work Order : VA22A4775  
 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: 439717) - continued</b>											
FJ2200599-018	Anonymous	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	31.0	29.4	5.36%	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	1.63	1.71	4.99%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	62.1	59.4	4.45%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	150	160	6.48%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	3.3	3.7	0.4	Diff <2x LOR	----
<b>Metals (QC Lot: 439718)</b>											
FJ2200599-018	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	0.0851	0.0799	0.0052	Diff <2x LOR	----



## 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: 439720)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 439717)</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: 439717) - 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: 439718)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>TCLP Metals (QCLot: 430943)</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	----
<b>TCLP Metals (QCLot: 430944)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



## 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: 439719)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
<b>Physical Tests (QCLot: 439720)</b>									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
<b>Metals (QCLot: 439717)</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	107	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	110	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.9	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.9	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	101	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	103	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	99.8	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.1	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	104	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	105	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.4	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	106	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	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: 439717) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	105	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	113	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	93.1	80.0	120	----
<b>Metals (QCLot: 439718)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	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: 430943)</b>										
VA22A4775-001	BA2209-A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.2 mg/L	12.5 mg/L	113	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.249 mg/L	0.25 mg/L	99.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.62 mg/L	10 mg/L	96.2	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.243 mg/L	0.25 mg/L	97.1	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.24 mg/L	1.25 mg/L	99.2	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	2.42 mg/L	2.5 mg/L	96.9	50.0	140	----
		iron, TCLP	7439-89-6	E444	242 mg/L	250 mg/L	97.0	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	292 mg/L	250 mg/L	117	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.48 mg/L	2.5 mg/L	99.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.94 mg/L	5 mg/L	98.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.105 mg/L	0.1 mg/L	105	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.24 mg/L	5 mg/L	105	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	102	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	97.4	50.0	150	----
<b>TCLP Metals (QCLot: 430944)</b>										
VA22A4775-001	BA2209-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----



## Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
<b>Metals (QCLot: 439717)</b>									
QC-439717-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	117	70.0	130	----
QC-439717-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	102	70.0	130	----
QC-439717-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	117	70.0	130	----
QC-439717-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	120	70.0	130	----
QC-439717-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	115	70.0	130	----
QC-439717-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
QC-439717-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	112	70.0	130	----
QC-439717-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	----
QC-439717-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	124	70.0	130	----
QC-439717-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	115	70.0	130	----
QC-439717-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	111	70.0	130	----
QC-439717-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	113	70.0	130	----
QC-439717-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	116	70.0	130	----
QC-439717-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	111	70.0	130	----
QC-439717-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	119	70.0	130	----
QC-439717-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	123	70.0	130	----
QC-439717-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	114	70.0	130	----
QC-439717-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	114	70.0	130	----
QC-439717-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	109	70.0	130	----
QC-439717-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	123	70.0	130	----
QC-439717-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	116	70.0	130	----
QC-439717-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	113	70.0	130	----
QC-439717-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	116	40.0	160	----
QC-439717-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	103	70.0	130	----
QC-439717-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	119	70.0	130	----
QC-439717-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	129	70.0	130	----
QC-439717-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	119	70.0	130	----
QC-439717-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	113	70.0	130	----
QC-439717-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	93.8	70.0	130	----

Page : 11 of 11  
 Work Order : VA22A4775  
 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: 439718)</b>									
QC-439718-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----

