

## Bottom Ash Data

2022 Week 28

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The following analytical report represents bottom ash composite results for week 28 of 2022 (July 10, 2022 to July 16, 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 : **VA22B6540**  
Client : **Covanta Burnaby Renewable Energy, ULC**  
Contact : Robin Johnson  
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 : 19-Jul-2022 11:30  
Date Analysis Commenced : 29-Jul-2022  
Issue Date : 03-Aug-2022 09:29

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>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, 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	BA2228-A-1	BA2228-A-2	BA2228-A-3	BA2228-A-4	BA2228-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-001	VA22B6540-002	VA22B6540-003	VA22B6540-004	VA22B6540-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	19.0	18.1	19.0	17.4	18.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	10.5	10.4	10.6	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	39200	32100	50200	37300	36400	
antimony	7440-36-0	E440	0.10	mg/kg	115	114	101	100	101	
arsenic	7440-38-2	E440	0.10	mg/kg	53.4	53.9	52.3	45.7	64.2	
barium	7440-39-3	E440	0.50	mg/kg	620	563	543	548	545	
beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.46	0.44	0.38	0.44	
bismuth	7440-69-9	E440	0.20	mg/kg	6.00	11.6	7.86	7.52	6.54	
boron	7440-42-8	E440	5.0	mg/kg	206	187	207	274	186	
cadmium	7440-43-9	E440	0.020	mg/kg	9.83	11.7	39.5	8.88	9.04	
calcium	7440-70-2	E440	50	mg/kg	139000	142000	136000	126000	135000	
chromium	7440-47-3	E440	0.50	mg/kg	168	195	184	152	163	
cobalt	7440-48-4	E440	0.10	mg/kg	39.1	250	629	1610	167	
copper	7440-50-8	E440	0.50	mg/kg	2180	6270	3340	7600	2810	
iron	7439-89-6	E440	50	mg/kg	46700	57200	51400	64600	79300	
lead	7439-92-1	E440	0.50	mg/kg	442	596	2420	1300	378	
lithium	7439-93-2	E440	2.0	mg/kg	25.2	31.3	33.6	23.6	26.5	
magnesium	7439-95-4	E440	20	mg/kg	11300	11400	10600	10800	11800	
manganese	7439-96-5	E440	1.0	mg/kg	740	719	1030	774	958	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0532	0.136	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	23.1	28.4	36.3	23.0	24.1	
nickel	7440-02-0	E440	0.50	mg/kg	137	194	324	162	177	
phosphorus	7723-14-0	E440	50	mg/kg	11700	13000	12600	10000	12600	
potassium	7440-09-7	E440	100	mg/kg	5260	5030	4970	4810	5250	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.40	0.36	0.32	0.34	
silver	7440-22-4	E440	0.10	mg/kg	4.66	4.94	6.04	8.11	4.78	
sodium	7440-23-5	E440	50	mg/kg	16600	17400	14600	15600	15700	
strontium	7440-24-6	E440	0.50	mg/kg	312	296	296	276	297	
sulfur	7704-34-9	E440	1000	mg/kg	11100	10900	11200	10600	11300	
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.057	0.079	0.078	0.056	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2228-A-1	BA2228-A-2	BA2228-A-3	BA2228-A-4	BA2228-A-5
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-001	VA22B6540-002	VA22B6540-003	VA22B6540-004	VA22B6540-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	151	155	108	1150	138	
titanium	7440-32-6	E440	1.0	mg/kg	360	218	304	296	252	
tungsten	7440-33-7	E440	0.50	mg/kg	14.0	10.1	12.3	16.6	12.8	
uranium	7440-61-1	E440	0.050	mg/kg	5.24	5.26	5.16	4.65	5.23	
vanadium	7440-62-2	E440	0.20	mg/kg	55.0	80.1	54.6	52.2	55.6	
zinc	7440-66-6	E440	2.0	mg/kg	3030	3720	3800	4910	3560	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	2.1	2.8	2.2	2.7	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.6	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.44	9.56	9.26	9.09	9.27	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.10	6.01	6.08	5.86	6.11	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.91	1.83	1.85	1.94	1.91	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.206	0.160	0.114	0.165	0.155	
calcium, TCLP	7440-70-2	E444	10	mg/L	1770	1830	1780	1750	1750	
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	4.72	1.08	0.578	0.801	0.794	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.26	1.21	0.947	2.13	0.789	
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	0.55	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	108	111	105	107	111	
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	0.41	0.72	0.43	0.70	0.65	
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	BA2228-A-1	BA2228-A-2	BA2228-A-3	BA2228-A-4	BA2228-A-5
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-001	VA22B6540-002	VA22B6540-003	VA22B6540-004	VA22B6540-005	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	96.9	24.2	30.3	56.1	36.8	
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 (Matrix: Soil/Solid)					Client sample ID	BA2228-A-6	BA2228-A-7	BA2228-A-8	BA2228-A-9	BA2228-A-10
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-006	VA22B6540-007	VA22B6540-008	VA22B6540-009	VA22B6540-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.6	16.2	17.8	18.9	18.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.6	10.6	10.4	10.6	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	42200	44300	36500	36200	38200	
antimony	7440-36-0	E440	0.10	mg/kg	107	249	129	130	105	
arsenic	7440-38-2	E440	0.10	mg/kg	53.7	56.1	56.2	60.1	48.7	
barium	7440-39-3	E440	0.50	mg/kg	600	588	724	559	652	
beryllium	7440-41-7	E440	0.10	mg/kg	0.45	0.49	0.43	0.44	0.48	
bismuth	7440-69-9	E440	0.20	mg/kg	7.50	15.9	10.4	8.39	9.16	
boron	7440-42-8	E440	5.0	mg/kg	200	204	196	189	198	
cadmium	7440-43-9	E440	0.020	mg/kg	9.83	12.8	12.9	13.6	9.88	
calcium	7440-70-2	E440	50	mg/kg	146000	155000	150000	150000	135000	
chromium	7440-47-3	E440	0.50	mg/kg	193	239	255	268	155	
cobalt	7440-48-4	E440	0.10	mg/kg	67.0	92.5	32.3	43.1	106	
copper	7440-50-8	E440	0.50	mg/kg	5020	2300	2750	11800	2260	
iron	7439-89-6	E440	50	mg/kg	80600	55600	62800	59900	61300	
lead	7439-92-1	E440	0.50	mg/kg	470	633	835	1710	354	
lithium	7439-93-2	E440	2.0	mg/kg	23.2	27.2	46.8	31.2	22.6	
magnesium	7439-95-4	E440	20	mg/kg	12100	12000	13200	11100	11600	
manganese	7439-96-5	E440	1.0	mg/kg	887	812	698	1040	1240	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0542	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	28.7	28.0	25.2	34.7	22.0	
nickel	7440-02-0	E440	0.50	mg/kg	315	148	137	145	264	
phosphorus	7723-14-0	E440	50	mg/kg	14600	13400	14500	12800	11200	
potassium	7440-09-7	E440	100	mg/kg	5430	5940	6150	5130	5000	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.42	0.38	0.45	0.39	
silver	7440-22-4	E440	0.10	mg/kg	7.93	5.29	9.88	9.25	6.36	
sodium	7440-23-5	E440	50	mg/kg	15900	16500	17700	15000	15400	
strontium	7440-24-6	E440	0.50	mg/kg	300	360	310	307	283	
sulfur	7704-34-9	E440	1000	mg/kg	11200	14400	12200	13000	11300	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.064	0.076	0.149	0.060	
tin	7440-31-5	E440	2.0	mg/kg	413	303	104	142	120	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2228-A-6	BA2228-A-7	BA2228-A-8	BA2228-A-9	BA2228-A-10
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-006	VA22B6540-007	VA22B6540-008	VA22B6540-009	VA22B6540-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
titanium	7440-32-6	E440	1.0	mg/kg	221	337	269	238	234	
tungsten	7440-33-7	E440	0.50	mg/kg	13.4	18.0	13.6	13.8	10.9	
uranium	7440-61-1	E440	0.050	mg/kg	4.86	6.12	6.38	5.48	4.92	
vanadium	7440-62-2	E440	0.20	mg/kg	61.3	60.1	63.4	58.3	53.2	
zinc	7440-66-6	E440	2.0	mg/kg	4520	4440	5100	4240	10700	
zirconium	7440-67-7	E440	1.0	mg/kg	3.9	2.3	1.9	2.0	2.6	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.7	11.7	11.7	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.49	9.42	9.38	9.57	9.42	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.00	5.78	5.85	5.87	6.42	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	1.90	2.08	2.14	2.14	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.154	0.145	0.167	0.147	0.622	
calcium, TCLP	7440-70-2	E444	10	mg/L	1850	1770	1880	1920	1770	
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	2.08	0.825	2.52	0.755	0.966	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.06	1.19	1.05	1.44	0.623	
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	121	117	124	118	117	
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	0.58	0.48	0.57	0.45	0.44	
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	48.7	38.1	46.4	39.0	25.2	





### Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2228-A-6	BA2228-A-7	BA2228-A-8	BA2228-A-9	BA2228-A-10
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00	13-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-006	VA22B6540-007	VA22B6540-008	VA22B6540-009	VA22B6540-010	
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	BA2228-A-11	BA2228-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	13-Jul-2022 09:00	13-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-011	VA22B6540-012	-----	-----	-----	
					Result	Result	----	----	----	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.4	18.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	36100	34200	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	132	96.0	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	67.2	64.3	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	501	520	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.41	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	10.9	7.06	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	197	167	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	13.2	10.0	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	145000	135000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	290	171	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	114	84.4	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	5380	3910	----	----	----	
iron	7439-89-6	E440	50	mg/kg	51100	67100	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	980	956	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	28.1	27.8	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11600	11800	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	901	972	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	59.5	29.1	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	244	205	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	13900	12200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5800	5050	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.35	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	11.7	5.25	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17500	14800	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	318	313	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13200	11100	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.067	<0.050	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	114	147	----	----	----	



**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2228-A-11	BA2228-A-12	----	----	----
Client sampling date / time					13-Jul-2022 09:00	13-Jul-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-011	VA22B6540-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
titanium	7440-32-6	E440	1.0	mg/kg	225	258	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	12.8	11.4	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	6.00	4.73	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	68.4	48.9	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	4210	4100	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	3.0	3.5	---	---	---	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.7	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.18	9.36	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	5.89	6.17	---	---	---	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	---	---	---	
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	1.91	2.07	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.157	0.158	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1680	1800	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.35	1.15	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.58	0.788	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	115	121	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.40	0.78	---	---	---	
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	39.9	37.7	---	---	---	



**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2228-A-11	BA2228-A-12	----	----	----
					Client sampling date / time	13-Jul-2022 09:00	13-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B6540-011	VA22B6540-012	-----	-----	-----	
					Result	Result	----	----	----	
<b>TCLP Metals</b>										
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>VA22B6540</b>	Page	: 1 of 16
Client	: <b>Covanta Burnaby Renewable Energy, ULC</b>	Laboratory	: Vancouver - Environmental
Contact	: Robin Johnson	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	: 19-Jul-2022 11:30
PO	: VANCO 0000051213	Issue Date	: 03-Aug-2022 09:28
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 Service 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 Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

#### **Outliers: Reference Material (RM) Samples**

- No Reference Material (RM) Sample outliers occur.

#### **Outliers : Analysis Holding Time Compliance (Breaches)**

- No Analysis Holding Time Outliers exist.

#### **Outliers : Frequency of Quality Control Samples**

- No Quality Control Sample Frequency Outliers occur.





**Outliers : Quality Control Samples**

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Duplicate (DUP) RPDs</b>								
Metals	VA22B6540-001	BA2228-A-1	bismuth	7440-69-9	E440	37.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	cobalt	7440-48-4	E440	160 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	copper	7440-50-8	E440	45.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	iron	7439-89-6	E440	32.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	lithium	7439-93-2	E440	46.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	silver	7440-22-4	E440	86.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	titanium	7440-32-6	E440	45.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B6540-001	BA2228-A-1	zinc	7440-66-6	E440	41.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

**Result Qualifiers**

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



## Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-1	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-10	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-11	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-12	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-2	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-3	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-4	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 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 BA2228-A-5	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-6	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-7	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-8	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2228-A-9	E510	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	28 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2228-A-1	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2228-A-10	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2228-A-11	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2228-A-12	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 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 BA2228-A-2	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-3	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-4	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-5	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-6	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-7	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-8	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2228-A-9	E440	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	180 days	20 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2228-A-1	E144	13-Jul-2022	----	----	----		29-Jul-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 BA2228-A-10	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-11	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-12	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-2	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-3	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-4	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-5	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-6	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2228-A-7	E144	13-Jul-2022	----	----	----		29-Jul-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 BA2228-A-8	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2228-A-9	E144	13-Jul-2022	----	----	----		29-Jul-2022	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-1	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-10	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-11	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-12	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-2	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-3	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-4	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 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 BA2228-A-5	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-6	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-7	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-8	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2228-A-9	E108	13-Jul-2022	02-Aug-2022	----	----		02-Aug-2022	30 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2228-A-1	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2228-A-10	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2228-A-11	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2228-A-12	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 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> BA2228-A-2	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-3	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-4	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-5	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-6	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-7	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-8	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2228-A-9	E512	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	28 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2228-A-1	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 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) BA2228-A-10	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-11	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-12	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-2	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-3	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-4	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-5	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-6	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2228-A-7	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 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> BA2228-A-8	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 days	✓	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2228-A-9	E444	29-Jul-2022	31-Jul-2022	----	----		31-Jul-2022	180 days	18 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> BA2228-A-1	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-10	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-11	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-12	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-2	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-3	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-4	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-5	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-6	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-7	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-8	EPP444	13-Jul-2022	29-Jul-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> BA2228-A-9	EPP444	13-Jul-2022	29-Jul-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	582719	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	582720	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	582722	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	582721	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	582719	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	582720	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	582722	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	582721	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	584017	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	582719	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	584018	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	582720	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	582722	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	584017	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	584018	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. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines.  Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444  Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510  Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with $\text{HNO}_3$ and $\text{HCl}$ , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512  Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAAS ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
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>: VA22B6540</b>	<b>Page</b>	<b>: 1 of 11</b>
<b>Client</b>	: Covanta Burnaby Renewable Energy, ULC	<b>Laboratory</b>	: Vancouver - Environmental
<b>Contact</b>	: Robin Johnson	<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>	: 19-Jul-2022 11:30
<b>PO</b>	: VANCO 0000051213	<b>Date Analysis Commenced</b>	: 29-Jul-2022
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 03-Aug-2022 09:28
<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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### 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>
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 11  
Work Order : VA22B6540  
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 Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent 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: 582721)</b>											
VA22B6540-001	BA2228-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	0.5%	5%	----
<b>Physical Tests (QC Lot: 582722)</b>											
VA22B6540-001	BA2228-A-1	moisture	----	E144	0.25	%	19.0	19.4	2.06%	20%	----
<b>Metals (QC Lot: 582719)</b>											
VA22B6540-001	BA2228-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 582720)</b>											
VA22B6540-001	BA2228-A-1	aluminum	7429-90-5	E440	50	mg/kg	39200	35000	11.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	115	125	7.88%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	53.4	62.9	16.3%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	620	515	18.5%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.42	0.08	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	6.00	8.75	37.3%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	206	174	16.8%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.83	12.0	19.9%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	139000	144000	3.61%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	168	190	12.3%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	39.1	348	160%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2180	3470	45.7%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	46700	65000	32.8%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	442	449	1.52%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	25.2	40.4	46.4%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	11300	12200	8.18%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	740	939	23.7%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	23.1	30.4	27.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	137	140	2.61%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	11700	12200	4.71%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5260	5600	6.37%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.48	0.14	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.66	11.7	86.0%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	16600	16400	1.45%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	312	321	2.87%	40%	----



Sub-Matrix: **Soil/Solid**

*Laboratory Duplicate (DUP) Report*

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Metals (QC Lot: 582720) - continued</b>											
VA22B6540-001	BA2228-A-1	sulfur	7704-34-9	E440	1000	mg/kg	11100	13500	19.6%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.066	0.009	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	151	102	39.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	360	227	45.1%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	14.0	15.7	11.4%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.24	5.81	10.2%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	55.0	56.3	2.31%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3030	4590	41.0%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.8	0.05	Diff <2x LOR	----

**Qualifiers**

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





## Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

### Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Physical Tests (QCLot: 582722)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 582719)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 582720)</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: 582720) - continued</b>						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
<b>TCLP Metals (QCLot: 584017)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 584018)</b>						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
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: 582721)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
<b>Physical Tests (QCLot: 582722)</b>									
moisture	----	E144	0.25	%	50 %	102	90.0	110	----
<b>Metals (QCLot: 582719)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	93.2	80.0	120	----
<b>Metals (QCLot: 582720)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.3	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.7	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.2	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.5	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	99.0	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.2	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100.0	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.4	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	95.8	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.4	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.2	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	111	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.6	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.9	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	97.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	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	88.8	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	106	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Metals (QCLot: 582720) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.4	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.8	80.0	120	----
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	100	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.2	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.4	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: 584017)</b>										
VA22B6540-001	BA2228-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	100	50.0	140	----
<b>TCLP Metals (QCLot: 584018)</b>										
VA22B6540-001	BA2228-A-1	antimony, TCLP	7440-36-0	E444	4.64 mg/L	5 mg/L	92.8	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.4 mg/L	12.5 mg/L	98.9	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.223 mg/L	0.25 mg/L	89.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.03 mg/L	10 mg/L	90.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.235 mg/L	0.25 mg/L	93.9	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.09 mg/L	1.25 mg/L	87.2	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	2.11 mg/L	2.5 mg/L	84.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	212 mg/L	250 mg/L	84.8	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.90 mg/L	10 mg/L	89.0	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	228 mg/L	250 mg/L	91.1	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.18 mg/L	2.5 mg/L	87.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.42 mg/L	5 mg/L	88.3	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.088 mg/L	0.1 mg/L	88.5	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.9	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.35 mg/L	5 mg/L	86.9	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.67 mg/L	0.75 mg/L	89.9	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	82.5	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:

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: 582719)</b>									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	97.6	70.0	130	---
<b>Metals (QCLot: 582720)</b>									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	---
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	101	70.0	130	---
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	---
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	105	70.0	130	---
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	120	70.0	130	---
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	136	40.0	160	---
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	110	70.0	130	---
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	---
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	---
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	105	70.0	130	---
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	101	70.0	130	---
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	109	70.0	130	---
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	109	70.0	130	---
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	116	70.0	130	---
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	---
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	111	70.0	130	---
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	110	70.0	130	---
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	---
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	99.7	70.0	130	---
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	116	70.0	130	---
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	112	70.0	130	---
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	---
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	110	40.0	160	---
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	97.1	70.0	130	---
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	---
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	112	70.0	130	---
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	112	70.0	130	---

Page : 11 of 11  
 Work Order : VA22B6540  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

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: 582720) - continued</b>									
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	102	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

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

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

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

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis Request				Number of Containers
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	
BA2228-A-1		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-2		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-3		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-4		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-5		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-6		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-7		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-8		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-9		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-10		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-11		13-Jul-22	9:00	Soil	X	X		X	1
BA2228-A-12		13-Jul-22	9:00	Soil	X	X		X	1

Environmental Division  
Vancouver  
Work Order Reference  
**VA22B6540**

Telephone : +1 604 253 4188

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.  
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.  
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

<b>SHIPMENT RELEASE</b> (client use)			<b>SHIPMENT RECEPTION</b> (lab use only)			<b>SHIPMENT VERIFICATION</b> (lab use only)			Observations: Yes / No ? If Yes add SIF
Released by:	Date (dd-mmm-yy):	Time (hh-mm):	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	
<i>[Signature]</i>	19-Jul-22	0800	CW	July 19	11:30	23 °C			