

## Bottom Ash Data

2022 Week 33

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The following analytical report represents bottom ash composite results for week 33 of 2022 (August 14, 2022 to August 20, 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 : **VA22B9645**  
Client : **Covanta Burnaby Renewable Energy, ULC**  
Contact : Nicole Victor  
Address : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
Telephone : ----  
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 : 23-Aug-2022 12:20  
Date Analysis Commenced : 24-Aug-2022  
Issue Date : 02-Sep-2022 09:15

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
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	BA2233-A-1	BA2233-A-2	BA2233-A-3	BA2232-A-4	BA2233-A-5
(Matrix: Soil/Solid)					Client sampling date / time	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-001	VA22B9645-002	VA22B9645-003	VA22B9645-004	VA22B9645-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.5	21.4	21.7	21.4	21.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.8	10.9	10.8	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	41000	32300	29300	32800	32300	
antimony	7440-36-0	E440	0.10	mg/kg	135	142	122	184	120	
arsenic	7440-38-2	E440	0.10	mg/kg	43.2	44.3	45.0	56.2	47.4	
barium	7440-39-3	E440	0.50	mg/kg	383	369	327	315	305	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.39	0.42	0.42	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	9.88	11.6	10.1	11.8	10.5	
boron	7440-42-8	E440	5.0	mg/kg	231	231	260	224	233	
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	20.4	15.4	17.5	26.9	
calcium	7440-70-2	E440	50	mg/kg	134000	138000	124000	145000	132000	
chromium	7440-47-3	E440	0.50	mg/kg	220	180	156	162	152	
cobalt	7440-48-4	E440	0.10	mg/kg	75.2	180	72.6	115	118	
copper	7440-50-8	E440	0.50	mg/kg	1410	1710	1400	2000	3120	
iron	7439-89-6	E440	50	mg/kg	58200	60300	73800	57200	57600	
lead	7439-92-1	E440	0.50	mg/kg	327	919	738	394	376	
lithium	7439-93-2	E440	2.0	mg/kg	26.1	26.8	34.2	26.6	25.4	
magnesium	7439-95-4	E440	20	mg/kg	10600	10500	10200	11400	10900	
manganese	7439-96-5	E440	1.0	mg/kg	804	1150	918	1280	682	
mercury	7439-97-6	E510	0.0500	mg/kg	0.131	0.219	0.193	0.189	0.218	
molybdenum	7439-98-7	E440	0.10	mg/kg	64.5	68.8	74.2	100	74.7	
nickel	7440-02-0	E440	0.50	mg/kg	211	209	148	160	106	
phosphorus	7723-14-0	E440	50	mg/kg	10600	11000	10400	12500	10400	
potassium	7440-09-7	E440	100	mg/kg	6150	6230	6020	6120	5640	
selenium	7782-49-2	E440	0.20	mg/kg	0.58	0.46	0.36	0.39	0.36	
silver	7440-22-4	E440	0.10	mg/kg	5.04	6.18	6.49	7.67	5.32	
sodium	7440-23-5	E440	50	mg/kg	16000	15200	15000	16800	14400	
strontium	7440-24-6	E440	0.50	mg/kg	287	380	271	307	297	
sulfur	7704-34-9	E440	1000	mg/kg	13100	14000	12500	13800	11800	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-1	BA2233-A-2	BA2233-A-3	BA2232-A-4	BA2233-A-5
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-001	VA22B9645-002	VA22B9645-003	VA22B9645-004	VA22B9645-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.078	0.068	0.065	0.065	0.062	
tin	7440-31-5	E440	2.0	mg/kg	144	138	111	702	108	
titanium	7440-32-6	E440	1.0	mg/kg	234	318	226	245	240	
tungsten	7440-33-7	E440	0.50	mg/kg	11.4	11.4	12.0	19.1	8.19	
uranium	7440-61-1	E440	0.050	mg/kg	5.17	5.68	5.74	5.89	4.81	
vanadium	7440-62-2	E440	0.20	mg/kg	52.4	58.1	54.1	56.2	48.6	
zinc	7440-66-6	E440	2.0	mg/kg	8810	4500	3640	4790	4060	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	1.3	1.5	2.2	2.2	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.6	11.7	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.75	9.45	9.22	9.53	9.27	
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	6.49	6.52	6.71	6.41	6.65	
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	2.27	2.29	2.34	2.23	2.42	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.210	0.200	0.158	0.269	0.151	
calcium, TCLP	7440-70-2	E444	10	mg/L	2190	2170	2150	2120	2230	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.22	1.52	1.26	0.868	0.899	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.04	0.913	0.663	0.890	0.757	
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	127	126	128	131	138	
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	0.56	0.42	0.46	0.46	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-1	BA2233-A-2	BA2233-A-3	BA2232-A-4	BA2233-A-5
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-001	VA22B9645-002	VA22B9645-003	VA22B9645-004	VA22B9645-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	25.1	25.7	15.5	26.2	15.6	15.6
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-6	BA2233-A-7	BA2233-A-8	BA2233-A-9	BA2233-A-10
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-006	VA22B9645-007	VA22B9645-008	VA22B9645-009	VA22B9645-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.0	21.0	19.3	20.0	22.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.0	10.8	11.0	10.8	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	33500	29100	33700	33200	30900	
antimony	7440-36-0	E440	0.10	mg/kg	134	139	152	142	130	
arsenic	7440-38-2	E440	0.10	mg/kg	38.0	45.8	46.9	43.5	72.8	
barium	7440-39-3	E440	0.50	mg/kg	305	303	422	351	339	
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.40	0.41	0.35	0.38	
bismuth	7440-69-9	E440	0.20	mg/kg	17.2	8.62	10.1	9.18	9.73	
boron	7440-42-8	E440	5.0	mg/kg	278	196	245	197	214	
cadmium	7440-43-9	E440	0.020	mg/kg	13.8	15.3	13.6	16.7	17.4	
calcium	7440-70-2	E440	50	mg/kg	135000	133000	134000	131000	124000	
chromium	7440-47-3	E440	0.50	mg/kg	153	126	150	477	176	
cobalt	7440-48-4	E440	0.10	mg/kg	65.3	239	80.6	267	56.4	
copper	7440-50-8	E440	0.50	mg/kg	3680	1820	7050	24100	1840	
iron	7439-89-6	E440	50	mg/kg	63400	47500	78000	59400	61600	
lead	7439-92-1	E440	0.50	mg/kg	628	1570	438	347	459	
lithium	7439-93-2	E440	2.0	mg/kg	31.7	31.8	25.8	25.8	41.7	
magnesium	7439-95-4	E440	20	mg/kg	10400	9770	10800	10600	11900	
manganese	7439-96-5	E440	1.0	mg/kg	835	685	1430	802	786	
mercury	7439-97-6	E510	0.0500	mg/kg	0.120	0.170	0.139	0.143	0.121	
molybdenum	7439-98-7	E440	0.10	mg/kg	61.1	60.0	111	137	74.4	
nickel	7440-02-0	E440	0.50	mg/kg	170	86.7	244	380	130	
phosphorus	7723-14-0	E440	50	mg/kg	10200	10100	9730	11100	9420	
potassium	7440-09-7	E440	100	mg/kg	5650	6280	5550	5740	5210	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.40	0.37	0.40	1.01	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	5.78	5.92	----	
silver	7440-22-4	E440	0.10	mg/kg	5.23	6.74	----	----	6.19	
sodium	7440-23-5	E440	50	mg/kg	14400	15300	15500	15700	13700	
strontium	7440-24-6	E440	0.50	mg/kg	264	271	295	347	282	
sulfur	7704-34-9	E440	1000	mg/kg	12800	11600	12200	13000	12200	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-6	BA2233-A-7	BA2233-A-8	BA2233-A-9	BA2233-A-10
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-006	VA22B9645-007	VA22B9645-008	VA22B9645-009	VA22B9645-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.064	0.056	0.063	0.059	0.060	
tin	7440-31-5	E440	2.0	mg/kg	138	176	2690	135	107	
titanium	7440-32-6	E440	1.0	mg/kg	245	176	268	196	218	
tungsten	7440-33-7	E440	0.50	mg/kg	11.5	7.69	9.01	7.44	9.02	
uranium	7440-61-1	E440	0.050	mg/kg	5.28	5.09	4.85	4.99	4.84	
vanadium	7440-62-2	E440	0.20	mg/kg	52.0	48.7	51.9	57.0	46.9	
zinc	7440-66-6	E440	2.0	mg/kg	3830	3690	4440	8140	3890	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.4	2.0	2.1	1.6	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.6	11.5	11.5	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.29	9.35	9.06	9.07	9.02	
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	6.69	6.21	6.45	6.44	6.70	
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	2.40	2.26	2.53	2.32	2.47	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.137	0.252	0.259	0.211	0.298	
calcium, TCLP	7440-70-2	E444	10	mg/L	2150	2080	2210	2150	2190	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.39	0.895	0.725	1.38	0.879	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.582	2.13	0.713	0.806	0.780	
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	124	125	130	132	127	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.41	0.78	0.51	0.51	0.43	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	





## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-6	BA2233-A-7	BA2233-A-8	BA2233-A-9	BA2233-A-10
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00	17-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-006	VA22B9645-007	VA22B9645-008	VA22B9645-009	VA22B9645-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	14.0	34.7	25.9	20.0	17.4	17.4
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



### Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2233-A-11	BA2233-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	17-Aug-2022 09:00	17-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-011	VA22B9645-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	21.2	22.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.0	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	32900	32300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	134	133	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	43.5	42.7	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	341	292	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	10.1	9.65	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	196	207	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	17.4	15.3	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	143000	133000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	152	152	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	173	41.6	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1890	1130	----	----	----	
iron	7439-89-6	E440	50	mg/kg	56900	54000	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	2330	447	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	25.1	19.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10300	11000	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	768	786	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.166	0.128	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	102	70.8	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	116	126	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11200	9890	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	6340	5990	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.44	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	9.48	10.7	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15900	14800	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	308	336	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13600	13000	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.054	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-11	BA2233-A-12	----	----	----
Client sampling date / time					17-Aug-2022 09:00	17-Aug-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-011	VA22B9645-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	134	108	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	239	213	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	11.0	8.70	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.66	5.14	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	55.7	52.2	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	5410	4020	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	2.3	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.95	9.06	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.40	6.61	----	----	----	
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	2.26	2.34	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.218	0.176	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2120	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	2.09	0.680	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.786	0.648	----	----	----	
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	136	130	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.50	0.39	----	----	----	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	----	----	----	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	



### Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2233-A-11	BA2233-A-12	----	----	----
					Client sampling date / time	17-Aug-2022 09:00	17-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B9645-011	VA22B9645-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>TCLP Metals</b>										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	31.3	14.5	----	----	----	
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>VA22B9645</b>	Page	: 1 of 16
Client	: <b>Covanta Burnaby Renewable Energy, ULC</b>	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 23-Aug-2022 12:20
PO	: VANCO 0000051213	Issue Date	: 02-Sep-2022 09:15
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.

**CAS Number:** Chemical Abstracts 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	VA22B9645-001	BA2233-A-1	cobalt	7440-48-4	E440	37.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B9645-001	BA2233-A-1	copper	7440-50-8	E440	36.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B9645-001	BA2233-A-1	nickel	7440-02-0	E440	78.6 % 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 : High Silver in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2233-A-8	E440.Ag	17-Aug-2022	31-Aug-2022	180 days	14 days	✓	31-Aug-2022	166 days	0 days	✓	
<b>Metals : High Silver in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2233-A-9	E440.Ag	17-Aug-2022	31-Aug-2022	180 days	14 days	✓	31-Aug-2022	166 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2232-A-4	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2233-A-1	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2233-A-10	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2233-A-11	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2233-A-12	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 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 BA2233-A-2	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-3	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-5	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-6	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-7	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-8	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2233-A-9	E510	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	28 days	12 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2232-A-4	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2233-A-1	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-10	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-11	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-12	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-2	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-3	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-5	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-6	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-7	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2233-A-8	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2233-A-9	E440	17-Aug-2022	26-Aug-2022	----	----		29-Aug-2022	180 days	13 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2232-A-4	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-1	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-10	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-11	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-12	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-2	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-3	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
<b>LDPE bag</b> BA2233-A-5	E144	17-Aug-2022	----	----	----		25-Aug-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 BA2233-A-6	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2233-A-7	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2233-A-8	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2233-A-9	E144	17-Aug-2022	----	----	----		25-Aug-2022	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2232-A-4	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-1	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-10	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-11	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-12	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-2	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-3	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-5	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-6	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-7	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-8	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2233-A-9	E108	17-Aug-2022	26-Aug-2022	----	----		26-Aug-2022	30 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2232-A-4	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2233-A-1	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-10	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-11	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-12	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-2	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-3	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-5	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-6	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-7	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-8	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2233-A-9	E512	24-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2232-A-4	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-1	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-10	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-11	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-12	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-2	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-3	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-5	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	





Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-6	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-7	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-8	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2233-A-9	E444	24-Aug-2022	27-Aug-2022	----	----		28-Aug-2022	180 days	11 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> BA2232-A-4	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-1	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-10	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-11	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-12	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-2	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-3	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-5	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-6	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-7	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-8	EPP444	17-Aug-2022	24-Aug-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> BA2233-A-9	EPP444	17-Aug-2022	24-Aug-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	619258	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	619257	2	12	16.6	5.0	✔
Moisture Content by Gravimetry	E144	619260	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	619259	1	14	7.1	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	627357	1	2	50.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	619258	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	619257	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	619260	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	619259	1	14	7.1	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	627357	1	2	50.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	621778	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	619258	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	621779	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	619257	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	619260	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	621778	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	621779	1	12	8.3	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108  Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144  Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl.  Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444  Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510  Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512  Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Leach 1:2 Soil:Water for pH/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444  Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA22B9645
Client : Covanta Burnaby Renewable Energy, ULC
Contact : Nicole Victor
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : ---
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, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 23-Aug-2022 12:20
Date Analysis Commenced : 24-Aug-2022
Issue Date : 02-Sep-2022 09:15

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

This 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.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Alex Thornton (Analyst), Angela Ren (Team Leader - Metals), Ophelia Chiu (Department Manager - Organics), and Robin Weeks (Team Leader - Metals).

Page : 2 of 11  
Work Order : VA22B9645  
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: 619259)</b>											
VA22B9645-001	BA2233-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.0%	5%	----
<b>Physical Tests (QC Lot: 619260)</b>											
VA22B9645-001	BA2233-A-1	moisture	----	E144	0.25	%	22.5	22.0	2.33%	20%	----
<b>Metals (QC Lot: 619257)</b>											
VA22B9645-001	BA2233-A-1	cadmium	7440-43-9	E440	0.020	mg/kg	11.0	14.2	25.3%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	75.2	51.7	37.0%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1410	2040	36.2%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	327	374	13.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	211	91.9	78.6%	30%	DUP-H
VA22B9645-001	BA2233-A-1	titanium	7440-32-6	E440	1.0	mg/kg	234	230	2.06%	40%	----
		aluminum	7429-90-5	E440	50	mg/kg	41000	34500	17.4%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	135	140	3.48%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	43.2	49.6	13.8%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	383	303	23.5%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.40	0.002	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	9.88	12.0	19.3%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	231	236	2.15%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	134000	147000	9.45%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	220	192	13.2%	30%	----
		iron	7439-89-6	E440	50	mg/kg	58200	62500	7.25%	30%	----
		lithium	7439-93-2	E440	2.0	mg/kg	26.1	27.5	5.40%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	10600	11400	7.19%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	804	918	13.2%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	64.5	77.9	18.8%	40%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10600	11500	8.23%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6150	6200	0.842%	40%	----
selenium	7782-49-2	E440	0.20	mg/kg	0.58	0.43	0.15	Diff <2x LOR	----		
silver	7440-22-4	E440	0.10	mg/kg	5.04	5.50	8.73%	40%	----		
sodium	7440-23-5	E440	50	mg/kg	16000	15900	0.650%	40%	----		
strontium	7440-24-6	E440	0.50	mg/kg	287	337	15.9%	40%	----		
sulfur	7704-34-9	E440	1000	mg/kg	13100	13800	5.06%	30%	----		



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: 619257) - continued</b>											
VA22B9645-001	BA2233-A-1	thallium	7440-28-0	E440	0.050	mg/kg	0.078	0.085	0.007	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	144	124	15.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	11.4	8.86	25.0%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.17	5.86	12.6%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	52.4	56.5	7.66%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	8810	7940	10.4%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.3	2.6	0.3	Diff <2x LOR	----
<b>Metals (QC Lot: 619258)</b>											
VA22B9645-001	BA2233-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.131	0.175	0.0445	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: 619260)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 619257)</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: 619257) - 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: 619258)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 627357)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 621778)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 621779)</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: 619259)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.5	95.0	105	---
<b>Physical Tests (QCLot: 619260)</b>									
moisture	---	E144	0.25	%	50 %	102	90.0	110	---
<b>Metals (QCLot: 619257)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.4	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.8	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.0	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.8	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.8	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	96.4	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.6	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.1	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.6	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	97.2	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	102	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.5	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	105	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.8	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.5	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.8	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	98.0	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: 619257) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.1	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.9	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.4	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	106	80.0	120	----
<b>Metals (QCLot: 619258)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	119	80.0	120	----
<b>Metals (QCLot: 627357)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 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: 621778)</b>										
VA22B9645-001	BA2233-A-1	mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	107	50.0	140	----
<b>TCLP Metals (QCLot: 621779)</b>										
VA22B9645-001	BA2233-A-1	antimony, TCLP	7440-36-0	E444	5.47 mg/L	5 mg/L	109	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.4	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.7 mg/L	12.5 mg/L	109	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.230 mg/L	0.25 mg/L	91.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.04 mg/L	10 mg/L	90.4	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.236 mg/L	0.25 mg/L	94.4	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	1.16 mg/L	1.25 mg/L	92.9	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	2.28 mg/L	2.5 mg/L	91.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	225 mg/L	250 mg/L	90.0	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.6 mg/L	10 mg/L	106	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	263 mg/L	250 mg/L	105	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.31 mg/L	2.5 mg/L	92.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.79 mg/L	5 mg/L	95.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.103 mg/L	0.1 mg/L	103	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.6 mg/L	5 mg/L	112	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.17 mg/L	5 mg/L	103	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.8	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	88.5	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: 619257)</b>									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	99.1	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	97.9	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	90.5	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	83.2	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	99.9	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	112	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	87.6	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	98.8	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	96.3	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	94.2	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	92.2	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	92.8	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	96.8	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	97.6	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	98.0	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	94.3	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	95.8	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	90.8	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	94.6	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	95.4	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	93.0	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	124	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	88.1	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	90.3	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	91.0	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	93.9	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	90.9	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	79.6	70.0	130	----

Page : 11 of 11  
 Work Order : VA22B9645  
 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: 619258)</b>									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	113	70.0	130	----



<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)	
Company: Covanta Energy		<input type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: Steve McKinney / Dan Skrypynk		<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	
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 3: dskrypynk@covanta.com		<b>Analysis Request</b>	
		brent.kirkpatrick@metrovancover.org			
		Sarah.Wellman@metrovancover.org			

<b>Invoice To</b> Same as Report ?		<b>Client / Project Information</b>		Please indicate below Filtered, Preserved or both (F, P, F/P)																						
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:																								
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																								
Contact:		LSD: (includes 2:1 pH)																								
Address:		Quote #:		<table border="1" style="width: 100%; text-align: center;"> <tr> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">MOISTURE</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">Chrome 6</td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-CSR+FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</td> </tr> <tr> <td colspan="6"></td> </tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers						
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)																		Number of Containers					
Phone: Fax:																										

Lab Work Order # (lab use only)		ALS Contact:		Sampler:	
9645					

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers
BA2233-A-1		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-2		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-3		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-4		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-5		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-6		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-7		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-8		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-9		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-10		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-11		17-Aug-22	9:00	Soil	X	X		X							1
BA2233-A-12		17-Aug-22	9:00	Soil	X	X		X							1

**Environmental Division**  
**Vancouver**  
 Work Order Reference  
**VA22B9645**  
  
 Telephone : + 1 604 253 4188

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

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

<b>SHIPMENT RELEASE (client use)</b>			<b>SHIPMENT RECEPTION (lab use only)</b>			<b>SHIPMENT VERIFICATION (lab use only)</b>				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? Yes add SIF
<i>[Signature]</i>	23-Aug-22	0800				23, 23	<i>[Signature]</i>	Aug-23/22	1220	<i>[Signature]</i>