

Bottom Ash Data

2022 Week 32

The following analytical report represents bottom ash composite results for week 32 of 2022 (August 7, 2022 to August 13, 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 : **VA22B9075**
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 : 16-Aug-2022 12:45
Date Analysis Commenced : 19-Aug-2022
Issue Date : 29-Aug-2022 15:34

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
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Gammar Almas	Lab Assistant	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	BA2232-A-1	BA2232-A-2	BA2232-A-3	BA2232-A-4	BA2232-A-5
(Matrix: Soil/Solid)					Client sampling date / time	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-001	VA22B9075-002	VA22B9075-003	VA22B9075-004	VA22B9075-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	18.3	18.2	19.4	19.1	18.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.1	10.1	10.2	10.2	10.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	54500	33000	43000	61400	41500	
antimony	7440-36-0	E440	0.10	mg/kg	113	116	86.9	79.5	115	
arsenic	7440-38-2	E440	0.10	mg/kg	56.9	60.1	36.8	35.3	61.5	
barium	7440-39-3	E440	0.50	mg/kg	449	377	542	520	491	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.37	0.40	0.38	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	13.3	10.8	5.92	5.65	8.62	
boron	7440-42-8	E440	5.0	mg/kg	202	197	239	142	214	
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	39.8	8.22	9.12	11.7	
calcium	7440-70-2	E440	50	mg/kg	126000	130000	111000	114000	133000	
chromium	7440-47-3	E440	0.50	mg/kg	152	199	173	163	141	
cobalt	7440-48-4	E440	0.10	mg/kg	121	60.2	37.6	26.0	77.8	
copper	7440-50-8	E440	0.50	mg/kg	3010	1540	997	1680	3110	
iron	7439-89-6	E440	50	mg/kg	56100	59800	48200	42100	52800	
lead	7439-92-1	E440	0.50	mg/kg	952	1300	280	648	532	
lithium	7439-93-2	E440	2.0	mg/kg	39.5	28.2	25.8	20.6	32.0	
magnesium	7439-95-4	E440	20	mg/kg	11000	11000	10000	9500	11500	
manganese	7439-96-5	E440	1.0	mg/kg	933	1020	858	660	834	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	98.1	77.6	59.9	55.6	80.7	
nickel	7440-02-0	E440	0.50	mg/kg	174	199	125	130	134	
phosphorus	7723-14-0	E440	50	mg/kg	11400	12100	8640	10400	12400	
potassium	7440-09-7	E440	100	mg/kg	6300	5780	5690	5550	5900	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.36	0.25	0.25	0.39	
silver	7440-22-4	E440	0.10	mg/kg	4.07	7.56	2.90	4.00	4.39	
sodium	7440-23-5	E440	50	mg/kg	16300	15200	15900	15200	15200	
strontium	7440-24-6	E440	0.50	mg/kg	300	306	808	465	334	
sulfur	7704-34-9	E440	1000	mg/kg	13900	14600	9900	10600	14700	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2232-A-1	BA2232-A-2	BA2232-A-3	BA2232-A-4	BA2232-A-5
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-001	VA22B9075-002	VA22B9075-003	VA22B9075-004	VA22B9075-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.058	0.054	0.052	0.061	0.059	
tin	7440-31-5	E440	2.0	mg/kg	108	160	96.2	154	126	
titanium	7440-32-6	E440	1.0	mg/kg	588	312	452	886	333	
tungsten	7440-33-7	E440	0.50	mg/kg	5.51	6.36	2.95	4.25	5.27	
uranium	7440-61-1	E440	0.050	mg/kg	5.16	5.29	4.24	4.40	5.43	
vanadium	7440-62-2	E440	0.20	mg/kg	49.4	53.0	40.8	51.6	48.6	
zinc	7440-66-6	E440	2.0	mg/kg	4070	4760	2970	3840	4490	
zirconium	7440-67-7	E440	1.0	mg/kg	3.5	2.4	2.0	3.8	2.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.2	11.4	11.3	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.32	7.64	8.29	8.18	8.26	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.25	6.23	6.31	6.57	6.32	
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	2.02	2.10	2.10	2.07	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	4.06	0.198	0.175	0.260	0.169	
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	2100	2050	2050	2110	
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	1.82	1.34	1.48	2.40	1.74	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.17	0.800	0.951	1.04	1.00	
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	116	130	118	116	124	
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	0.80	0.76	0.49	0.59	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	BA2232-A-1	BA2232-A-2	BA2232-A-3	BA2232-A-4	BA2232-A-5
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-001	VA22B9075-002	VA22B9075-003	VA22B9075-004	VA22B9075-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
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	38.8	36.4	29.7	36.4	33.6	33.6
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	BA2232-A-6	BA2232-A-7	BA2232-A-8	BA2232-A-9	BA2232-A-10
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-006	VA22B9075-007	VA22B9075-008	VA22B9075-009	VA22B9075-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.2	19.2	18.9	18.9	18.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.2	10.3	10.1	10.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31600	35800	39000	32600	31200	
antimony	7440-36-0	E440	0.10	mg/kg	111	117	116	130	122	
arsenic	7440-38-2	E440	0.10	mg/kg	56.9	47.8	55.9	69.1	51.9	
barium	7440-39-3	E440	0.50	mg/kg	482	548	384	326	422	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	0.36	0.38	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	8.76	9.85	9.34	9.84	7.54	
boron	7440-42-8	E440	5.0	mg/kg	193	215	185	196	218	
cadmium	7440-43-9	E440	0.020	mg/kg	12.7	10.3	20.3	14.6	12.8	
calcium	7440-70-2	E440	50	mg/kg	129000	120000	130000	139000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	156	168	162	162	156	
cobalt	7440-48-4	E440	0.10	mg/kg	273	53.0	217	134	233	
copper	7440-50-8	E440	0.50	mg/kg	1560	2910	2130	2690	3750	
iron	7439-89-6	E440	50	mg/kg	66500	64400	54900	46900	61800	
lead	7439-92-1	E440	0.50	mg/kg	474	1550	945	707	692	
lithium	7439-93-2	E440	2.0	mg/kg	46.3	24.8	29.2	38.4	38.4	
magnesium	7439-95-4	E440	20	mg/kg	10800	10500	11100	11200	11100	
manganese	7439-96-5	E440	1.0	mg/kg	1100	904	788	907	918	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	69.5	97.8	94.4	91.1	74.4	
nickel	7440-02-0	E440	0.50	mg/kg	139	121	152	165	231	
phosphorus	7723-14-0	E440	50	mg/kg	11900	10600	12000	13300	11400	
potassium	7440-09-7	E440	100	mg/kg	5580	5350	5880	6200	5540	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.30	0.38	0.39	0.30	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	6.08	----	----	
silver	7440-22-4	E440	0.10	mg/kg	3.52	4.95	----	4.98	6.16	
sodium	7440-23-5	E440	50	mg/kg	15500	14600	15700	15700	15100	
strontium	7440-24-6	E440	0.50	mg/kg	336	305	337	385	323	
sulfur	7704-34-9	E440	1000	mg/kg	14200	12200	15100	19200	13300	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2232-A-6	BA2232-A-7	BA2232-A-8	BA2232-A-9	BA2232-A-10
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-006	VA22B9075-007	VA22B9075-008	VA22B9075-009	VA22B9075-010	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.055	0.055	0.061	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	110	143	113	147	299	
titanium	7440-32-6	E440	1.0	mg/kg	386	424	306	326	309	
tungsten	7440-33-7	E440	0.50	mg/kg	8.03	5.80	5.54	7.28	6.50	
uranium	7440-61-1	E440	0.050	mg/kg	5.15	4.70	5.48	6.07	4.81	
vanadium	7440-62-2	E440	0.20	mg/kg	47.8	45.4	51.0	51.8	47.8	
zinc	7440-66-6	E440	2.0	mg/kg	4730	6130	5070	5410	4090	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.7	3.4	2.3	2.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.2	11.3	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.45	7.89	8.56	8.03	7.65	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.19	6.25	6.23	6.30	6.19	
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	2.08	2.03	2.06	2.14	2.00	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.187	0.259	0.158	0.168	0.164	
calcium, TCLP	7440-70-2	E444	10	mg/L	2070	2070	2110	2000	2070	
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	1.54	0.975	0.886	1.50	1.96	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.63	1.55	1.42	1.14	1.32	
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	120	114	116	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	1.04	0.56	0.49	0.45	0.67	
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	BA2232-A-6	BA2232-A-7	BA2232-A-8	BA2232-A-9	BA2232-A-10
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00	10-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-006	VA22B9075-007	VA22B9075-008	VA22B9075-009	VA22B9075-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
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	38.3	46.2	48.1	32.8	36.8	36.8
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				
(Matrix: Soil/Solid)					BA2232-A-11	BA2232-A-12	----	----	----
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-011	VA22B9075-012	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
moisture	----	E144	0.25	%	18.8	18.6	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	9.92	10.4	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	38200	38200	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	120	120	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	58.0	56.2	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	442	539	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.38	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	9.05	7.49	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	195	193	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	18.8	12.6	----	----	----
calcium	7440-70-2	E440	50	mg/kg	131000	122000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	219	167	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	44.3	155	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	2250	1790	----	----	----
iron	7439-89-6	E440	50	mg/kg	67500	75700	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	829	544	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	32.0	28.8	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	10600	10800	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	916	854	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	90.6	78.4	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	236	155	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	13100	11500	----	----	----
potassium	7440-09-7	E440	100	mg/kg	5960	5440	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.34	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	4.34	7.69	----	----	----
sodium	7440-23-5	E440	50	mg/kg	15700	15200	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	348	310	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	15300	12900	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.073	<0.050	----	----	----



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2232-A-11	BA2232-A-12	----	----	----
Client sampling date / time					10-Aug-2022 09:00	10-Aug-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-011	VA22B9075-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	355	137	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	370	508	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	6.41	6.18	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	5.55	4.78	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	51.5	47.0	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	6820	5360	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.6	2.2	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.4	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.19	8.16	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.28	6.32	---	---	---	
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	2.08	2.05	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.187	0.162	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2090	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	2.58	1.64	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.961	1.17	---	---	---	
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	119	124	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.68	0.46	---	---	---	
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	BA2232-A-11	BA2232-A-12	----	----	----
					Client sampling date / time	10-Aug-2022 09:00	10-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B9075-011	VA22B9075-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	37.9	31.5	----	----	----	
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	: VA22B9075	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	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	: 16-Aug-2022 12:45
PO	: VANCO 0000051213	Issue Date	: 29-Aug-2022 15:34
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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) 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
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	magnesium	7439-95-4	E440	38.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	manganese	7439-96-5	E440	30.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	nickel	7440-02-0	E440	1.09 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	Anonymous	Anonymous	potassium	7440-09-7	E440	41.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	uranium	7440-61-1	E440	45.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	zinc	7440-66-6	E440	114 % 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.

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG3-6142720 02	----	uranium	7440-61-1	E440	121 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



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		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2232-A-8	E440.Ag	10-Aug-2022	27-Aug-2022	180 days	17 days	✓	28-Aug-2022	163 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-1	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-10	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-11	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-12	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-2	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-3	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-4	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-5	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-6	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-7	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-8	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2232-A-9	E510	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	28 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2232-A-1	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2232-A-10	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2232-A-11	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 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		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-12	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-2	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-3	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-4	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-5	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-6	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-7	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-8	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2232-A-9	E440	10-Aug-2022	23-Aug-2022	----	----		24-Aug-2022	180 days	14 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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-1	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-10	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-11	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-12	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-2	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-3	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-4	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-5	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2232-A-6	E144	10-Aug-2022	----	----	----		23-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		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2232-A-7	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2232-A-8	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2232-A-9	E144	10-Aug-2022	----	----	----		23-Aug-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-1	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-10	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-11	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-12	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-2	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days		✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-3	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-4	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-5	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-6	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-7	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-8	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2232-A-9	E108	10-Aug-2022	24-Aug-2022	----	----		24-Aug-2022	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-1	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-10	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-11	E512	19-Aug-2022	21-Aug-2022	----	----		21-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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-12	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-2	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-3	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-4	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-5	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-6	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-7	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-8	E512	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2232-A-9	E512	19-Aug-2022	21-Aug-2022	----	----		21-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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-1	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-10	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-11	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-12	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-2	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-3	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-4	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-5	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-6	E444	19-Aug-2022	21-Aug-2022	----	----		21-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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-7	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-8	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2232-A-9	E444	19-Aug-2022	21-Aug-2022	----	----		21-Aug-2022	180 days	11 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-1	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-10	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-11	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-12	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-2	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-3	EPP444	10-Aug-2022	19-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	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-4	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-5	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-6	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-7	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-8	EPP444	10-Aug-2022	19-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2232-A-9	EPP444	10-Aug-2022	19-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	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	614273	1	18	5.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	614272	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	614276	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	614275	1	19	5.2	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	621890	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	614273	2	18	11.1	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	614272	2	19	10.5	10.0	✔
Moisture Content by Gravimetry	E144	614276	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	614275	1	19	5.2	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	621890	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	611736	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	614273	1	18	5.5	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	611737	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	614272	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	614276	1	19	5.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	611736	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	611737	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 ₃ 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 ₃ 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 ₃ 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 ₃ 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 ₃ 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 : **VA22B9075**
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 : 16-Aug-2022 12:45
Date Analysis Commenced : 19-Aug-2022
Issue Date : 29-Aug-2022 15:33

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
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 11
Work Order : VA22B9075
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash-Suite



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

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



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
Physical Tests (QC Lot: 614275)											
VA22B9061-010	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.65	8.70	0.6%	5%	----
Physical Tests (QC Lot: 614276)											
VA22B9075-001	BA2232-A-1	moisture	----	E144	0.25	%	18.3	18.9	3.28%	20%	----
Metals (QC Lot: 614272)											
VA22B9061-010	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	1490	1130	27.1%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	0.39	0.47	0.08	Diff <2x LOR	----
		barium	7440-39-3	E440	0.50	mg/kg	13.2	9.15	35.9%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	864	989	13.5%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	5.52	4.37	23.1%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	1.23	0.98	23.0%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	4.58	4.00	13.4%	30%	----
		iron	7439-89-6	E440	50	mg/kg	4130	3670	11.9%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	1.90	2.13	0.22	Diff <2x LOR	----
		lithium	7439-93-2	E440	2.0	mg/kg	4.9	3.4	1.5	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	1560	1060	38.0%	30%	DUP-H
		manganese	7439-96-5	E440	1.0	mg/kg	42.9	31.6	30.5%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	3.87	# 2.78	1.09	Diff <2x LOR	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	249	280	31	Diff <2x LOR	----
		potassium	7440-09-7	E440	100	mg/kg	810	530	41.1%	40%	DUP-H
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	1760	1710	2.89%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	5.91	5.04	15.8%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 614272) - continued											
VA22B9061-010	Anonymous	tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	230	173	28.5%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.532	0.845	45.5%	30%	DUP-H
		vanadium	7440-62-2	E440	0.20	mg/kg	6.10	5.47	10.9%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	7.8	28.1	114%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.2	0.2	Diff <2x LOR	----
Metals (QC Lot: 614273)											
VA22B9061-010	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

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

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 614276)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 614272)						
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
Metals (QCLot: 614272) - continued						
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	----
Metals (QCLot: 614273)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 621890)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 611736)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 611737)						
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	
Physical Tests (QCLot: 614275)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.5	95.0	105	---
Physical Tests (QCLot: 614276)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 614272)									
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	113	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	100.0	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	106	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	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	99.6	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	108	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	110	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.3	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	114	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	113	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	105	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	113	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	109	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	105	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	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	
Metals (QCLot: 614272) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	110	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	# 121	80.0	120	MES
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	118	80.0	120	----
Metals (QCLot: 614273)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	108	80.0	120	----
Metals (QCLot: 621890)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	89.4	80.0	120	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



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 $\geq 1 \times$ 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
TCLP Metals (QCLot: 611736)										
VA22B9075-001	BA2232-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----
TCLP Metals (QCLot: 611737)										
VA22B9075-001	BA2232-A-1	antimony, TCLP	7440-36-0	E444	4.88 mg/L	5 mg/L	97.6	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.1	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.239 mg/L	0.25 mg/L	95.4	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.76 mg/L	10 mg/L	87.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.19 mg/L	1.25 mg/L	95.2	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.29 mg/L	2.5 mg/L	91.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	228 mg/L	250 mg/L	91.3	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.89 mg/L	10 mg/L	98.9	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	249 mg/L	250 mg/L	99.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.11 mg/L	5 mg/L	102	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	5.0 mg/L	5 mg/L	100	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.00 mg/L	5 mg/L	100	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.3	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	87.5	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	
Metals (QCLot: 614272)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	109	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	105	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	104	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	117	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	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	108	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	107	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	115	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	123	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	110	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	102	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	118	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	113	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	109	70.0	130	----

Page : 11 of 11
 Work Order : VA22B9075
 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	
Metals (QCLot: 614273)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	106	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To		Report Format / Distribution		Service Requested (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		Email 1: smckinney@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Burnaby BC		Email 2: rjohnson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Phone: 604-521-1025		Email 3: dskrypnik@covanta.com		Analysis Request	
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No		brent.kirkpatrick@metrovancover.org			
		Sarah.Wellman@metrovancover.org			

Invoice To Same as Report ?		Client / Project Information		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 #:		<table border="1"> <tr> <td rowspan="4">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4">MOISTURE</td> <td rowspan="4">Chrome 6</td> <td rowspan="4">MET-CSR+FULL-VA (all metals)</td> <td colspan="6">Number of Containers</td> </tr> <tr> <td colspan="6"></td> </tr> <tr> <td colspan="6"></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																							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																			
Contact:		LSD: (includes 2:1 pH)																																			
Address:		Quote #:																																			
Phone:		Fax:																																			

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					
BA2232-A-1		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-2		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-3		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-4		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-5		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-6		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-7		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-8		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-9		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-10		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-11		10-Aug-22	9:00	Soil	X	X		X						1
BA2232-A-12		10-Aug-22	9:00	Soil	X	X		X						1

Environmental Division
Vancouver
Work Order Reference
VA22B9075



Telephone : +1 604 253 4188

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy): 16-Aug-22	Time (hh-mm): 0800	Received by:	Date: 16-Aug-22	Time: 12:45 PM	Temperature: 24, 24 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF