Bottom Ash Data

2022 Week 51

The following analytical report represents bottom ash composite results for week 51 of 2022 (December 18, 2022 to December 24, 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	: **VA22D0755**	Page	: 1 of 11
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 BC Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 21-Dec-2022 13:50
PO	: VANCO 0000051213	Date Analysis Commenced	: 28-Dec-2022
C-O-C number	: ----	Issue Date	: 03-Jan-2023 09:32
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This 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.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Sam Silveira	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).

Unit	*Description*
%	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.

Qualifiers

Qualifier	*Description*
DUPH	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-1	BA2250-A-2	BA2250-A-3	BA2250-A-4	BA2250-A-5
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-001	VA22D0755-002	VA22D0755-003	VA22D0755-004	VA22D0755-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		24.6	23.9	24.6	24.9	25.6
pH (1:2 soil:water)	----	E108	0.10	pH units		10.6	10.3	10.7	10.4	10.5
Metals										
aluminum	7429-90-5	E440	50	mg/kg		46600	35700	45600	46200	39500
antimony	7440-36-0	E440	0.10	mg/kg		115	143	113	144	125
arsenic	7440-38-2	E440	0.10	mg/kg		30.0	22.5	16.7	20.3	29.9
barium	7440-39-3	E440	0.50	mg/kg		634	654	516	522	634
beryllium	7440-41-7	E440	0.10	mg/kg		0.36	0.45	0.48	0.35	0.35
bismuth	7440-69-9	E440	0.20	mg/kg		15.0	10.1	6.59	7.88	7.64
boron	7440-42-8	E440	5.0	mg/kg		231	238	177	173	175
cadmium	7440-43-9	E440	0.020	mg/kg		7.10	11.6	6.79	11.2	7.31
calcium	7440-70-2	E440	50	mg/kg		142000	159000	132000	142000	146000
chromium	7440-47-3	E440	0.50	mg/kg		368	269	190	210	635
cobalt	7440-48-4	E440	0.10	mg/kg		206	74.0	48.7	58.3	130
Copper	7440-50-8	E440	0.50	mg/kg		2820	7290	4620	2710	2730
iron	7439-89-6	E440	50	mg/kg		56800	82700	63600	70700	58900
lead	7439-92-1	E440	0.50	mg/kg		376	974	384	403	487
lithium	7439-93-2	E440	2.0	mg/kg		30.3	33.7	26.8	24.8	26.7
magnesium	7439-95-4	E440	20	mg/kg		11400	12700	11900	12200	12100
manganese	7439-96-5	E440	1.0	mg/kg		1080	1210	920	858	804
mercury	7439-97-6	E510	0.0500	mg/kg		0.197 DUPH	0.0658	0.0670	<0.0500	0.0774
molybdenum	7439-98-7	E440	0.10	mg/kg		25.7	25.7	43.1	28.3	31.2
nickel	7440-02-0	E440	0.50	mg/kg		242	368	257	121	400
phosphorus	7723-14-0	E440	50	mg/kg		14800	17900	11800	14300	16600
potassium	7440-09-7	E440	100	mg/kg		6380	6490	5430	5430	5550
selenium	7782-49-2	E440	0.20	mg/kg		0.41	0.41	0.27	0.33	0.34
Silver	7440-22-4	E440	0.10	mg/kg		7.57	12.9	23.6	7.71	17.5
sodium	7440-23-5	E440	50	mg/kg		18800	20700	16800	17700	18200
strontium	7440-24-6	E440	0.50	mg/kg		278	368	576	301	313

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-1	BA2250-A-2	BA2250-A-3	BA2250-A-4	BA2250-A-5
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-001	VA22D0755-002	VA22D0755-003	VA22D0755-004	VA22D0755-005
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		12500	14600	11400	12800	12000
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		970	280	1080	127	134
titanium	7440-32-6	E440	1.0	mg/kg		527	418	360	371	521
tungsten	7440-33-7	E440	0.50	mg/kg		60.1	68.1	55.4	38.3	162
uranium	7440-61-1	E440	0.050	mg/kg		2.37	2.81	2.33	2.42	2.77
vanadium	7440-62-2	E440	0.20	mg/kg		33.3	40.8	38.3	34.5	35.0
zinc	7440-66-6	E440	2.0	mg/kg		3280	3900	3020	3790	2720
zirconium	7440-67-7	E440	1.0	mg/kg		2.3	2.1	3.8	4.4	2.5
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	11.3	11.4	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		3.63	5.46	2.58	3.52	2.53
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.91	2.91	4.91	4.91	4.91
pH, TCLP final	----	EPP444	0.010	pH units		9.59	6.41	9.75	9.52	9.72
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		0.89	2.08	0.87	0.91	0.87
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	0.103	<0.050	<0.050	<0.050
calcium, TCLP	7440-70-2	E444	10	mg/L		858	1910	886	890	872
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	1.30	<0.050	<0.050	<0.050
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.530	0.858	0.502	0.510	0.506
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		15.1	117	15.4	15.6	15.0
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		<0.25	0.45	<0.25	<0.25	<0.25
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-1	BA2250-A-2	BA2250-A-3	BA2250-A-4	BA2250-A-5
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-001	VA22D0755-002	VA22D0755-003	VA22D0755-004	VA22D0755-005
						Result	Result	Result	Result	Result
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	20.0	<0.50	<0.50	<0.50
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

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

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-6	BA2250-A-7	BA2250-A-8	BA2250-A-9	BA2250-A-10
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-006	VA22D0755-007	VA22D0755-008	VA22D0755-009	VA22D0755-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		25.6	25.4	25.8	25.6	24.9
pH (1:2 soil:water)	----	E108	0.10	pH units		10.4	10.4	10.4	10.4	10.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		49400	31500	37300	33100	41800
antimony	7440-36-0	E440	0.10	mg/kg		127	126	151	122	156
arsenic	7440-38-2	E440	0.10	mg/kg		21.7	43.2	24.0	22.4	23.6
barium	7440-39-3	E440	0.50	mg/kg		548	637	650	576	637
beryllium	7440-41-7	E440	0.10	mg/kg		0.39	0.37	0.48	0.46	0.41
bismuth	7440-69-9	E440	0.20	mg/kg		7.68	23.8	10.4	7.89	11.9
boron	7440-42-8	E440	5.0	mg/kg		178	253	263	185	183
cadmium	7440-43-9	E440	0.020	mg/kg		9.02	8.97	13.1	7.22	9.42
calcium	7440-70-2	E440	50	mg/kg		140000	141000	171000	148000	166000
chromium	7440-47-3	E440	0.50	mg/kg		187	239	541	239	241
cobalt	7440-48-4	E440	0.10	mg/kg		49.8	56.2	72.4	94.7	51.8
Copper	7440-50-8	E440	0.50	mg/kg		1740	3700	3010	6700	3330
iron	7439-89-6	E440	50	mg/kg		75300	66500	92000	54700	58800
lead	7439-92-1	E440	0.50	mg/kg		668	1740	587	1270	567
lithium	7439-93-2	E440	2.0	mg/kg		25.4	25.3	30.6	28.5	28.6
magnesium	7439-95-4	E440	20	mg/kg		12000	9820	13800	12800	13400
manganese	7439-96-5	E440	1.0	mg/kg		930	939	1180	8350	1020
mercury	7439-97-6	E510	0.0500	mg/kg		0.0899	0.0780	0.0752	0.0602	0.0903
molybdenum	7439-98-7	E440	0.10	mg/kg		21.3	30.2	32.6	28.0	28.5
nickel	7440-02-0	E440	0.50	mg/kg		160	320	358	282	234
phosphorus	7723-14-0	E440	50	mg/kg		13400	12100	14900	13400	16900
potassium	7440-09-7	E440	100	mg/kg		5620	5060	7160	5930	7070
selenium	7782-49-2	E440	0.20	mg/kg		0.37	0.42	0.49	0.33	0.49
Silver	7440-22-4	E440.Ag	0.10	mg/kg		----	7.22	----	----	10.7
Silver	7440-22-4	E440	0.10	mg/kg		21.5	----	14.4	11.2	----
sodium	7440-23-5	E440	50	mg/kg		18000	15000	20300	18500	21300
strontium	7440-24-6	E440	0.50	mg/kg		320	294	360	293	340

Analytical Results

Sub-Matrix: Soil/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-6	BA2250-A-7	BA2250-A-8	BA2250-A-9	BA2250-A-10
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-006	VA22D0755-007	VA22D0755-008	VA22D0755-009	VA22D0755-010
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		14000	13400	16000	14300	16000
thallium	7440-28-0	E440	0.050	mg/kg		0.154	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		105	226	176	151	898
titanium	7440-32-6	E440	1.0	mg/kg		594	402	492	404	424
tungsten	7440-33-7	E440	0.50	mg/kg		83.9	192	74.6	73.4	80.4
uranium	7440-61-1	E440	0.050	mg/kg		2.58	2.80	3.10	2.70	3.09
vanadium	7440-62-2	E440	0.20	mg/kg		41.2	34.6	44.4	38.7	42.4
zinc	7440-66-6	E440	2.0	mg/kg		3580	2890	4100	5840	3610
zirconium	7440-67-7	E440	1.0	mg/kg		3.2	2.1	2.1	1.7	2.3
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	11.4	11.4	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		2.50	2.40	3.63	2.58	2.36
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		4.91	4.91	4.91	4.91	4.91
pH, TCLP final	----	EPP444	0.010	pH units		9.76	9.60	9.52	9.62	9.57
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		0.86	0.87	0.93	0.91	0.89
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
calcium, TCLP	7440-70-2	E444	10	mg/L		850	845	890	876	902
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.512	0.510	0.507	0.546	0.511
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		15.0	13.8	16.4	14.0	15.1
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		<0.25	<0.25	<0.25	<0.25	<0.25
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: **Soil/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2250-A-6	BA2250-A-7	BA2250-A-8	BA2250-A-9	BA2250-A-10
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00	14-Dec-2022 09:00
						VA22D0755-006	VA22D0755-007	VA22D0755-008	VA22D0755-009	VA22D0755-010
						Result	Result	Result	Result	Result
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	<10	<10	<10

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

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2250-A-11	BA2250-A-12	----	----	----
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22D0755-011	VA22D0755-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%		26.5	25.1	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		10.4	10.5	----	----	----
Metals										
aluminum	7429-90-5	E440	50	mg/kg		41700	36100	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg		124	154	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg		20.4	18.0	----	----	----
barium	7440-39-3	E440	0.50	mg/kg		649	426	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg		0.37	0.39	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg		9.06	7.98	----	----	----
boron	7440-42-8	E440	5.0	mg/kg		300	229	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg		7.55	7.05	----	----	----
calcium	7440-70-2	E440	50	mg/kg		156000	145000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg		176	186	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg		85.1	733	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg		1760	3450	----	----	----
iron	7439-89-6	E440	50	mg/kg		98400	56900	----	----	----
lead	7439-92-1	E440	0.50	mg/kg		799	557	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg		26.0	31.2	----	----	----
magnesium	7439-95-4	E440	20	mg/kg		12000	10900	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg		1010	983	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg		0.0519	<0.0500	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg		24.2	79.4	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg		151	209	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg		13700	11800	----	----	----
potassium	7440-09-7	E440	100	mg/kg		5880	5490	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg		0.34	0.36	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg		9.16	11.2	----	----	----
sodium	7440-23-5	E440	50	mg/kg		18400	17800	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg		336	335	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg		14000	13600	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2250-A-11	BA2250-A-12	----	----	----
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22D0755-011	VA22D0755-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	----	----	----
tin	7440-31-5	E440	2.0	mg/kg		144	281	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		582	313	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		65.7	49.8	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		2.53	2.55	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		37.1	61.6	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		2950	3000	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		2.4	3.7	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		5.04	3.08	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.91	4.91	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.47	9.63	----	----	----
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		2.09	0.90	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.092	<0.050	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		1950	884	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.27	<0.050	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.08	0.560	----	----	----
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		121	14.7	----	----	----
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	<0.25	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2250-A-11	BA2250-A-12	----	----	----
					Client sampling date / time	14-Dec-2022 09:00	14-Dec-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22D0755-011	VA22D0755-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	----	----	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----
zinc, TCLP	7440-66-6	E444	0.50	mg/L		24.6	<0.50	----	----	----
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.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22D0755**	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	: 21-Dec-2022 13:50
PO	: VANCO 0000051213	Issue Date	: 03-Jan-2023 09:32
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
Duplicate (DUP) RPDs								
Metals	VA22D0755-001	BA2250-A-1	arsenic	7440-38-2	E440	42.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	bismuth	7440-69-9	E440	34.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	cobalt	7440-48-4	E440	124 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	Copper	7440-50-8	E440	38.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	lead	7439-92-1	E440	66.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	Silver	7440-22-4	E440	64.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	tin	7440-31-5	E440	142 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	zinc	7440-66-6	E440	89.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22D0755-001	BA2250-A-1	mercury	7439-97-6	E510	0.130 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-10	E440.Ag	14-Dec-2022	29-Dec-2022	180 days	16 days	✓	30-Dec-2022	164 days	1 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-7	E440.Ag	14-Dec-2022	29-Dec-2022	180 days	16 days	✓	30-Dec-2022	164 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-1	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-10	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-11	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-12	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-2	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-3	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-4	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-5	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-6	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-7	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-8	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2250-A-9	E510	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	28 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-1	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-10	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-11	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-12	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-2	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-3	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-4	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-5	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-6	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-7	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-8	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2250-A-9	E440	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	180 days	15 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-1	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-10	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-11	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-12	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-2	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-3	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-4	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-5	E144	14-Dec-2022	----	----	----		28-Dec-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-6	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-7	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-8	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2250-A-9	E144	14-Dec-2022	----	----	----		28-Dec-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-1	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-10	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-11	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-12	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-2	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-3	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-4	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-5	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-6	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-7	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-8	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2250-A-9	E108	14-Dec-2022	29-Dec-2022	----	----		29-Dec-2022	30 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-1	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-10	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-11	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-12	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-2	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-3	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-4	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-5	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-6	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-7	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-8	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2250-A-9	E512	28-Dec-2022	30-Dec-2022	----	----		30-Dec-2022	28 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-1	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-10	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-11	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-12	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-2	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-3	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-4	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-5	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-6	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-7	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-8	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2250-A-9	E444	28-Dec-2022	30-Dec-2022	----	----		03-Jan-2023	180 days	19 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-1	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-10	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-11	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-12	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-2	EPP444	14-Dec-2022	28-Dec-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-3	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-4	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-5	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-6	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-7	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-8	EPP444	14-Dec-2022	28-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2250-A-9	EPP444	14-Dec-2022	28-Dec-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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	789993	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	789994	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	789999	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	789995	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	791296	1	2	50.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	789993	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	789994	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	789999	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	789995	1	12	8.3	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	791296	1	2	50.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	792055	2	15	13.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	789993	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	792056	2	15	13.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	789994	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	789999	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	792055	2	15	13.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	792056	2	15	13.3	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 ºC) 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 HNO3 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 HNO3 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 HNO3 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

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°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 HNO3 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 HNO3 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	: **VA22D0755**	Page	: 1 of 13
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	: 21-Dec-2022 13:50
PO	: VANCO 0000051213	Date Analysis Commenced	: 28-Dec-2022
C-O-C number	: ----	Issue Date	: 03-Jan-2023 09:32
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

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: 789995)											
VA22D0755-001	BA2250-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.5	0.6%	5%	----
Physical Tests (QC Lot: 789999)											
VA22D0755-001	BA2250-A-1	Moisture	----	E144	0.25	%	24.6	25.5	3.78%	20%	----
Metals (QC Lot: 789993)											
VA22D0755-001	BA2250-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.197	# 0.0669	0.130	Diff <2x LOR	DUP-H
Metals (QC Lot: 789994)											
VA22D0755-001	BA2250-A-1	aluminum	7429-90-5	E440	50	mg/kg	46600	40700	13.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	115	122	5.74%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	30.0	19.4	42.6%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	634	560	12.4%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.41	0.05	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	15.0	10.6	34.4%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	231	235	1.77%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	7.10	8.28	15.3%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	142000	147000	3.88%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	368	344	6.75%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	206	48.1	124%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2820	1920	38.2%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	56800	55600	2.17%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	376	752	66.7%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	30.3	25.8	16.1%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11400	12100	6.18%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1080	1070	0.540%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	25.7	23.8	7.70%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	242	192	22.9%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	14800	12900	13.8%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6380	5930	7.30%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.41	0.35	0.07	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	7.57	14.8	64.9%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	18800	19600	4.37%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 789994) - continued											
VA22D0755-001	BA2250-A-1	strontium	7440-24-6	E440	0.50	mg/kg	278	306	9.83%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	12500	13200	5.24%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	970	164	142%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	527	400	27.4%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	60.1	66.8	10.5%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	2.37	2.59	8.79%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	33.3	35.9	7.61%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3280	8630	89.9%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	2.3	2.6	0.3	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: 789999)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 789993)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 789994)						
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	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 789994) - continued						
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	----
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: 791296)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 792053)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 792054)						
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	----
TCLP Metals (QCLot: 792055)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 792056)						

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 792056) - continued						
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				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 789995)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 789999)									
Moisture	----	E144	0.25	%	50 %	99.6	90.0	110	----
Metals (QCLot: 789993)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 789994)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.8	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	112	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	104	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.6	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.3	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.1	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.1	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.2	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	106	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	108	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.2	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.4	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	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
Metals (QCLot: 789994) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.8	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.4	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.7	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	108	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100.0	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	100	80.0	120	----
Metals (QCLot: 791296)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	98.7	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
TCLP Metals (QCLot: 792053)										
VA22D0755-002	BA2250-A-2	mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	107	50.0	140	----
TCLP Metals (QCLot: 792054)										
VA22D0755-002	BA2250-A-2	antimony, TCLP	7440-36-0	E444	4.81 mg/L	5 mg/L	96.2	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.8	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.238 mg/L	0.25 mg/L	95.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.17 mg/L	10 mg/L	91.7	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.253 mg/L	0.25 mg/L	101	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.24 mg/L	1.25 mg/L	99.6	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	2.34 mg/L	2.5 mg/L	93.8	50.0	140	----
		iron, TCLP	7439-89-6	E444	248 mg/L	250 mg/L	99.0	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.40 mg/L	10 mg/L	94.0	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	240 mg/L	250 mg/L	95.8	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.38 mg/L	2.5 mg/L	95.0	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.89 mg/L	5 mg/L	97.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.114 mg/L	0.1 mg/L	114	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	94.8	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.84 mg/L	5 mg/L	96.9	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	102	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	93.2	50.0	150	----
TCLP Metals (QCLot: 792055)										
VA22C9882-012	Anonymous	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 792056)										
VA22C9882-012	Anonymous	antimony, TCLP	7440-36-0	E444	5.22 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.249 mg/L	0.25 mg/L	99.8	50.0	140	----

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: 792056) - continued										
VA22C9882-012	Anonymous	boron, TCLP	7440-42-8	E444	9.81 mg/L	10 mg/L	98.1	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.251 mg/L	0.25 mg/L	100	50.0	140	----
		calcium, TCLP	7440-70-2	E444	245 mg/L	250 mg/L	98.2	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.23 mg/L	1.25 mg/L	98.6	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	0.247 mg/L	0.25 mg/L	98.8	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.41 mg/L	2.5 mg/L	96.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	249 mg/L	250 mg/L	99.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.48 mg/L	10 mg/L	94.8	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	255 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.39 mg/L	2.5 mg/L	95.7	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.94 mg/L	5 mg/L	98.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.119 mg/L	0.1 mg/L	119	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	93.2	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.87 mg/L	5 mg/L	97.3	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	50.0	140	----
		zinc, TCLP	7440-66-6	E444	9.97 mg/L	10 mg/L	99.7	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	97.0	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:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 789993)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	111	70.0	130	----
Metals (QCLot: 789994)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	126	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	130	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	128	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	126	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	112	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	130	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	116	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	122	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	117	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	114	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	118	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	118	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	118	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	122	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	124	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	121	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	118	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	117	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	116	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	127	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	122	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	115	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	124	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	120	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Qualifier
Metals (QCLot: 789994) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	130	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	124	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	114	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	123	70.0	130	----

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Company:	Covanta Energy			☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business D
Contact:	Steve Mckinney / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - C
Address:	5150 Riverbend Drive			Email 1:	smckinney@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - C
	Burnaby BC			Email 2:	rjohnson4@covanta.com	○ Same Day or Weekend Emergency - Contact ALS
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com	Analysis Req
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org	
					Sarah.Wellman@metrovancouver.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?		☐ Yes	☐ No	Job #:		
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite	
Contact:				LSD:	(includes 2:1 pH)	
Address:						
Phone:		Fax:		Quote #:		
Lab Work Order # (lab use only)				**ALS Contact:**	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA2250-A-1	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-2	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-3	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-4	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-5	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-6	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-7	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-8	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-9	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-10	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-11	14-Dec-22	9:00	Soil	X	X		X	1
	BA2250-A-12	14-Dec-22	9:00	Soil	X	X		X	1

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	21-DEC-22	0800	AB	12/21/22	1430PM	13 °C				

GENF 20.00 Front