Bottom Ash Data

2023 Week 2

The following analytical report represents bottom ash composite results for week 2 of 2023 (January 8, 2023 to January 14, 2023).

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	: **VA23A1122**	Page	: 1 of 11
Amendment	: **1**		
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	: 17-Jan-2023 12:40
PO	: VANCO0000051998	Date Analysis Commenced	: 22-Jan-2023
C-O-C number	: ----	Issue Date	: 09-Feb-2023 10:56
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*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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.

Workorder Comments

This report replaces the previous version and contains updated TCLP Metals data for 2 samples due to TCLP Extraction Fluid Selection.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2302-A-1	BA2302-A-2	BA2302-A-3	BA2302-A-4	BA2302-A-5
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
						VA23A1122-001	VA23A1122-002	VA23A1122-003	VA23A1122-004	VA23A1122-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		22.9	20.9	20.1	18.4	22.4
pH (1:2 soil:water)	----	E108	0.10	pH units		11.2	11.2	11.1	11.2	11.2
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		36600	30900	31800	54400	38000
Antimony	7440-36-0	E440	0.10	mg/kg		116	91.0	105	99.1	308
Arsenic	7440-38-2	E440	0.10	mg/kg		17.6	14.2	18.1	14.0	17.2
Barium	7440-39-3	E440	0.50	mg/kg		744	785	797	807	759
Beryllium	7440-41-7	E440	0.10	mg/kg		0.45	0.44	0.45	0.44	0.63
Bismuth	7440-69-9	E440	0.20	mg/kg		12.1	10.6	13.2	11.3	12.2
Boron	7440-42-8	E440	5.0	mg/kg		230	241	169	235	388
Cadmium	7440-43-9	E440	0.020	mg/kg		13.6	10.8	14.2	28.7	8.17
Calcium	7440-70-2	E440	50	mg/kg		156000	147000	146000	142000	159000
Chromium	7440-47-3	E440	0.50	mg/kg		206	216	177	186	268
Cobalt	7440-48-4	E440	0.10	mg/kg		96.9	31.6	59.6	40.6	38.9
Copper	7440-50-8	E440	0.50	mg/kg		1700	1210	1260	6150	1690
Iron	7439-89-6	E440	50	mg/kg		74200	58900	74200	76700	55800
Lead	7439-92-1	E440	0.50	mg/kg		401	400	357	416	860
Lithium	7439-93-2	E440	2.0	mg/kg		31.3	26.6	23.5	28.0	25.3
Magnesium	7439-95-4	E440	20	mg/kg		12200	10400	10800	10700	12300
Manganese	7439-96-5	E440	1.0	mg/kg		965	1040	1510	1180	803
Mercury	7439-97-6	E510	0.0500	mg/kg		0.0506	<0.0500	<0.0500	0.0598	0.107
Molybdenum	7439-98-7	E440	0.10	mg/kg		25.4	16.5	16.2	19.9	19.3
Nickel	7440-02-0	E440	0.50	mg/kg		191	110	140	127	186
Phosphorus	7723-14-0	E440	50	mg/kg		12400	11200	11700	11300	13800
Potassium	7440-09-7	E440	100	mg/kg		5120	4950	4700	5090	5160
Selenium	7782-49-2	E440	0.20	mg/kg		0.40	0.34	0.37	0.36	0.36
Silver	7440-22-4	E440	0.10	mg/kg		7.62	4.96	6.43	4.90	9.16
Sodium	7440-23-5	E440	50	mg/kg		15900	16800	15300	17500	18200
Strontium	7440-24-6	E440	0.50	mg/kg		322	321	296	309	321

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2302-A-1	BA2302-A-2	BA2302-A-3	BA2302-A-4	BA2302-A-5
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
						VA23A1122-001	VA23A1122-002	VA23A1122-003	VA23A1122-004	VA23A1122-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440	1000	mg/kg		10100	9300	9500	9700	10400
Thallium	7440-28-0	E440	0.050	mg/kg		0.052	<0.050	<0.050	<0.050	0.052
Tin	7440-31-5	E440	2.0	mg/kg		119	103	176	134	164
Titanium	7440-32-6	E440	1.0	mg/kg		312	291	296	843	410
Tungsten	7440-33-7	E440	0.50	mg/kg		47.7	24.6	26.3	35.2	29.1
Uranium	7440-61-1	E440	0.050	mg/kg		4.27	3.93	3.93	4.01	4.27
Vanadium	7440-62-2	E440	0.20	mg/kg		43.2	37.2	38.4	45.1	37.4
Zinc	7440-66-6	E440	2.0	mg/kg		3720	5350	2850	3590	3420
Zirconium	7440-67-7	E440	1.0	mg/kg		1.7	1.4	1.8	2.4	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.2	11.4	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.61	5.27	5.19	6.88	7.55
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		6.57	6.38	6.43	6.46	6.25
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		1.85	2.30	2.23	1.97	2.12
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.530	0.590	0.159	0.107	0.137
Calcium, TCLP	7440-70-2	E444	10	mg/L		1910	2180	2110	2100	2150
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		0.801	0.995	1.60	1.00	1.23
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.908	0.979	0.852	1.13	0.935
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		123	127	122	125	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		0.38	0.58	0.62	0.39	0.62
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	BA2302-A-1	BA2302-A-2	BA2302-A-3	BA2302-A-4	BA2302-A-5
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
						VA23A1122-001	VA23A1122-002	VA23A1122-003	VA23A1122-004	VA23A1122-005
						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		22.2	27.1	60.3	23.9	29.7
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	BA2302-A-6	BA2302-A-7	BA2302-A-8	BA2302-A-9	BA2302-A-10
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
						VA23A1122-006	VA23A1122-007	VA23A1122-008	VA23A1122-009	VA23A1122-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		20.9	20.2	22.0	19.5	21.2
pH (1:2 soil:water)	----	E108	0.10	pH units		11.3	11.1	11.2	11.2	11.2
Metals										
Aluminum	7429-90-5	E440	50	mg/kg		47800	52000	39500	34800	40400
Antimony	7440-36-0	E440	0.10	mg/kg		92.2	108	125	138	119
Arsenic	7440-38-2	E440	0.10	mg/kg		14.8	14.4	17.9	17.3	18.3
Barium	7440-39-3	E440	0.50	mg/kg		626	678	575	633	667
Beryllium	7440-41-7	E440	0.10	mg/kg		0.39	0.47	0.51	0.42	0.43
Bismuth	7440-69-9	E440	0.20	mg/kg		11.8	11.1	17.2	14.2	26.3
Boron	7440-42-8	E440	5.0	mg/kg		249	233	225	280	183
Cadmium	7440-43-9	E440	0.020	mg/kg		10.3	7.19	8.93	8.58	12.4
Calcium	7440-70-2	E440	50	mg/kg		145000	148000	171000	148000	154000
Chromium	7440-47-3	E440	0.50	mg/kg		175	246	176	162	157
Cobalt	7440-48-4	E440	0.10	mg/kg		487	51.9	299	90.8	56.1
Copper	7440-50-8	E440	0.50	mg/kg		2430	1500	3230	1560	5520
Iron	7439-89-6	E440	50	mg/kg		68800	65500	70700	62100	59200
Lead	7439-92-1	E440	0.50	mg/kg		349	323	880	1400	863
Lithium	7439-93-2	E440	2.0	mg/kg		47.6	30.6	44.8	50.3	28.6
Magnesium	7439-95-4	E440	20	mg/kg		10200	10400	12300	9970	11400
Manganese	7439-96-5	E440	1.0	mg/kg		831	994	988	964	935
Mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	0.161	0.0695	<0.0500	0.142
Molybdenum	7439-98-7	E440	0.10	mg/kg		20.1	34.8	24.7	25.0	19.5
Nickel	7440-02-0	E440	0.50	mg/kg		132	169	191	199	139
Phosphorus	7723-14-0	E440	50	mg/kg		14000	14000	13100	11800	11800
Potassium	7440-09-7	E440	100	mg/kg		4470	4660	5270	4580	4780
Selenium	7782-49-2	E440	0.20	mg/kg		0.33	0.42	0.44	0.38	0.51
Silver	7440-22-4	E440	0.10	mg/kg		4.89	4.60	8.75	4.96	8.11
Sodium	7440-23-5	E440	50	mg/kg		15500	14800	17400	16200	14900
Strontium	7440-24-6	E440	0.50	mg/kg		271	288	379	360	315
Sulfur	7704-34-9	E440	1000	mg/kg		8500	8800	11300	10400	10200

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2302-A-6	BA2302-A-7	BA2302-A-8	BA2302-A-9	BA2302-A-10
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
						VA23A1122-006	VA23A1122-007	VA23A1122-008	VA23A1122-009	VA23A1122-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	0.061	0.054	0.139
Tin	7440-31-5	E440	2.0	mg/kg		115	535	869	111	534
Titanium	7440-32-6	E440	1.0	mg/kg		382	600	299	409	405
Tungsten	7440-33-7	E440	0.50	mg/kg		41.0	47.7	33.9	29.0	42.6
Uranium	7440-61-1	E440	0.050	mg/kg		3.86	3.86	4.75	3.99	4.33
Vanadium	7440-62-2	E440	0.20	mg/kg		36.1	39.8	42.7	37.3	40.2
Zinc	7440-66-6	E440	2.0	mg/kg		2960	2740	9950	4610	3950
Zirconium	7440-67-7	E440	1.0	mg/kg		3.4	3.9	2.0	1.4	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.5	11.6	11.6	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.01	6.15	5.62	6.76	7.33
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		6.44	6.31	6.34	6.32	6.50
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		2.18	2.24	2.24	2.21	2.42
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.126	0.703	0.110	0.108	0.096
Calcium, TCLP	7440-70-2	E444	10	mg/L		2110	2140	2150	2160	2100
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		2.05	3.60	5.90	1.94	1.68
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.782	1.14	1.40	1.33	0.749
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		122	127	130	121	126
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		0.54	0.62	0.54	0.77	0.66
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

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2302-A-6	BA2302-A-7	BA2302-A-8	BA2302-A-9	BA2302-A-10
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00	11-Jan-2023 09:00
Analyte	CAS Number	Method	LOR	Unit		VA23A1122-006	VA23A1122-007	VA23A1122-008	VA23A1122-009	VA23A1122-010
						Result	Result	Result	Result	Result
TCLP Metals										
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		23.5	28.6	31.1	23.9	22.9
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	BA2302-A-11	BA2302-A-12	----	----	----
				Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1122-011	VA23A1122-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144	0.25	%	20.7	21.7	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.3	----	----	----
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	33800	37900	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	144	137	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	27.0	20.2	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	554	664	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	0.51	0.44	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	23.0	20.9	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	244	222	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	12.8	10.2	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	185000	170000	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	214	180	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	206	246	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	2240	2150	----	----	----
Iron	7439-89-6	E440	50	mg/kg	66000	80500	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	655	459	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	36.4	49.8	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	13700	13400	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	1290	1090	----	----	----
Mercury	7439-97-6	E510	0.0500	mg/kg	0.0727	0.0590	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	25.1	27.9	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	214	232	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	14500	14300	----	----	----
Potassium	7440-09-7	E440	100	mg/kg	5360	5520	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	0.53	0.53	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	8.92	5.78	----	----	----
Sodium	7440-23-5	E440	50	mg/kg	16600	17600	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	378	328	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	13000	12100	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2302-A-11	BA2302-A-12	----	----	----
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A1122-011	VA23A1122-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg		0.053	0.067	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg		152	124	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg		265	406	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg		34.4	42.1	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg		5.12	4.93	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg		52.9	46.5	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg		4670	4260	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg		1.7	1.6	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.5	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.16	6.32	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.44	6.27	----	----	----
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		2.32	2.15	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.106	0.180	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L		2180	2090	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L		2.37	1.42	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L		0.838	0.666	----	----	----
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		126	123	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.49	0.69	----	----	----
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	BA2302-A-11	BA2302-A-12	----	----	----
					Client sampling date / time	11-Jan-2023 09:00	11-Jan-2023 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A1122-011	VA23A1122-012	--------	--------	--------
						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		19.6	32.2	----	----	----
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	: **VA23A1122**	Page	: 1 of 16
Amendment	: 1		
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	: 17-Jan-2023 12:40
PO	: VANCO0000051998	Issue Date	: 09-Feb-2023 10:56
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

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.

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Reference Material (RM) Sample								
Metals	QC-MRG2-8105480 03	----	Titanium	7440-32-6	E440	132 % MES	70.0-130%	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-1	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-10	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-11	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-12	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-2	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-3	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-4	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-5	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-6	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-7	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-8	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2302-A-9	E510	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-1	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-10	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-11	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-12	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-2	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-3	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-4	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-5	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-6	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-7	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-8	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2302-A-9	E440	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	180 days	14 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-1	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	

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 BA2302-A-10	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-11	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-12	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-2	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-3	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-4	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-5	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-6	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-7	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	

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 BA2302-A-8	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2302-A-9	E144	11-Jan-2023	----	----	----		22-Jan-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-1	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-10	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-11	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-12	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-2	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-3	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-4	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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 BA2302-A-5	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-6	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-7	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-8	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2302-A-9	E108	11-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	30 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-1	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-10	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-11	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-12	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2302-A-2	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-3	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-4	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-5	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-6	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-7	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-8	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2302-A-9	E512	24-Jan-2023	24-Jan-2023	----	----		24-Jan-2023	28 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-1	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	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 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) BA2302-A-10	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-11	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-12	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-2	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-3	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-4	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-5	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-6	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-7	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	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 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) BA2302-A-8	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2302-A-9	E444	24-Jan-2023	24-Jan-2023	----	----		25-Jan-2023	180 days	14 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-1	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-10	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-11	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-12	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-2	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-3	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2302-A-4	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	

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: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2302-A-5	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2302-A-6	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2302-A-7	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2302-A-8	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2302-A-9	EPP444	11-Jan-2023	24-Jan-2023	----	----		----	----	----	

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	810548	1	18	5.5	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	810549	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	810554	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	810550	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	810548	2	18	11.1	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	810549	2	18	11.1	10.0	✓
Moisture Content by Gravimetry	E144	810554	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	810550	1	18	5.5	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	812575	2	12	16.6	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	810548	1	18	5.5	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	812576	2	12	16.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	810549	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	810554	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	812575	2	12	16.6	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	812576	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 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.
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
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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
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.

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QUALITY CONTROL REPORT

Work Order	: **VA23A1122**	Page	: 1 of 12
Amendment	: **1**		
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	: 17-Jan-2023 12:40
PO	: VANCO0000051998	Date Analysis Commenced	: 22-Jan-2023
C-O-C number	: ----	Issue Date	: 09-Feb-2023 10:56
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*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
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: 810550)											
VA23A1073-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.39	7.44	0.7%	5%	----
Physical Tests (QC Lot: 810554)											
VA23A1073-001	Anonymous	Moisture	----	E144	0.25	%	5.36	6.00	11.2%	20%	----
Metals (QC Lot: 810548)											
VA23A1073-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 810549)											
VA23A1073-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	9800	10200	3.80%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.22	0.20	0.01	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.31	3.02	9.16%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	54.9	55.3	0.675%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.18	0.19	0.007	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	0.114	0.113	0.0008	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	5420	5830	7.28%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	27.0	27.5	1.62%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	7.50	7.78	3.68%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	14.2	13.6	3.76%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	16600	17800	7.00%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	2.09	2.17	0.08	Diff <2x LOR	----
		Lithium	7439-93-2	E440	2.0	mg/kg	8.0	7.6	0.5	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	6710	7110	5.83%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	348	393	12.2%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.30	0.31	0.01	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	30.1	31.1	3.32%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	411	411	0.116%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	530	570	7.08%	40%	----
		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	277	286	2.95%	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: 810549) - continued											
VA23A1073-001	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	26.8	27.2	1.30%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	0.0009	Diff <2x LOR	----
		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	877	959	8.93%	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	0.261	0.268	0.007	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	43.0	48.3	11.6%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	37.9	38.4	1.31%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	4.0	4.4	0.3	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 810554)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 810548)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 810549)						
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: 810549) - 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	----
TCLP Metals (QCLot: 812573)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 812574)						
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: 812575)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 812576)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 812576) - continued						
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: 810550)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 810554)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 810548)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
Metals (QCLot: 810549)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.6	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	100	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.0	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.5	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.6	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.3	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.6	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.2	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.7	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	95.8	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.6	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.2	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	93.7	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	97.2	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	97.6	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.5	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	92.7	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	94.3	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: 810549) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	100	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	96.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.1	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	106	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.6	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	91.4	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 812573)										
VA23A1122-001	BA2302-A-1	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	91.3	50.0	140	----
TCLP Metals (QCLot: 812575)										
VA23A1122-002	BA2302-A-2	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	88.3	50.0	140	----
TCLP Metals (QCLot: 812576)										
VA23A1122-002	BA2302-A-2	Antimony, TCLP	7440-36-0	E444	5.26 mg/L	5 mg/L	105	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.7	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.9 mg/L	12.5 mg/L	111	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.238 mg/L	0.25 mg/L	95.0	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.70 mg/L	10 mg/L	97.0	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	1.13 mg/L	1.25 mg/L	90.4	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	2.16 mg/L	2.5 mg/L	86.6	50.0	140	----
		Iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	92.1	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.63 mg/L	10 mg/L	96.3	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	252 mg/L	250 mg/L	101	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.24 mg/L	2.5 mg/L	89.5	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.72 mg/L	5 mg/L	94.4	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	97.4	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.10 mg/L	5 mg/L	102	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	95.0	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:

					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: 810548)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	94.2	70.0	130	----
Metals (QCLot: 810549)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	115	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	120	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	115	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	115	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	128	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	109	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	122	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	111	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	112	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	112	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	110	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	104	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	116	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	118	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	112	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	99.9	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	126	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	112	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	114	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	114	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	109	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	# 132	70.0	130	MES

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: 810549) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	123	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	118	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	103	70.0	130	----

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).*

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Page 1 of 1

Report To			
Company:	Covanta Energy		
Contact:	Nicole Victor / Dan Skrypnyk		
Address:	5150 Riverbend Drive		
	Burnaby BC		
Phone:	604-521-1025	Fax:	
		☐ Yes	☐ No

Report Format / Distribution				
☐ Standard	☐ Other			
☑ PDF	☐ Excel	☐ Digital	☐ Fax	
Email 1:	nvictor@covanta.com			
Email 2:	rjohnson4@covanta.com			
Email 3:	dskrypnyk@covanta.com			
	brent.kirkpatrick@metrovancouver.org			
	Sarah.Wellman@metrovancouver.org			

Service Requested (Rush for routine analysis subject to availability)
◉ Regular (Standard Turnaround Times - Business Days)
○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To	Same as Report ?		
Hardcopy of Invoice with Report?	☐ Yes	☐ No	
Company:			
Contact:			
Address:			
Phone:		Fax:	

Client / Project Information	
Job #:	
PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite
LSD:	(includes 2:1 pH)
Quote #:	

Lab Work Order # (lab use only): 1122

ALS Contact:

Sampler:

Analysis Request

Please indicate below Filtered, Pres

Environmental Division Vancouver

Work Order Reference

VA23A1122

Telephone : +1 604 253 4188

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)	
	BA2302-A-1	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-2	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-3	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-4	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-5	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-6	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-7	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-8	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-9	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-10	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-11	11-Jan-23	9:00	Soil	X	X		X	1
	BA2302-A-12	11-Jan-23	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
	17/01/23	9AM		17/1/23	12:40PM	18 °C				