metrovancouver

Bottom Ash Data

2023 Week 29

The following analytical report represents bottom ash composite results for week 29 of 2023 (July 16, 2023 to July 22, 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	: **VA23B7341**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Jul-2023 12:20
PO	: VANCO0000051998	Date Analysis Commenced	: 31-Jul-2023
C-O-C number	: ----	Issue Date	: 03-Aug-2023 08:38
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
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, 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.

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2329-A-1	BA2329-A-2	BA2329-A-3	BA2329-A-4	BA2329-A-5
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
						VA23B7341-001	VA23B7341-002	VA23B7341-003	VA23B7341-004	VA23B7341-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.1	19.4	19.6	20.8	19.8
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.9	12.0	12.0	12.0	12.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		34000	34200	33000	34900	37400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		100	107	101	103	100
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		28.7	28.8	27.8	32.8	26.2
Barium	7440-39-3	E440/VA	0.50	mg/kg		558	565	574	504	588
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.37	0.38	0.38	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		6.88	8.20	8.69	7.36	7.16
Boron	7440-42-8	E440/VA	5.0	mg/kg		180	187	213	250	229
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		10.3	46.2	10.8	10.7	10.9
Calcium	7440-70-2	E440/VA	50	mg/kg		144000	151000	150000	152000	152000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		288	170	161	218	177
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		70.7	764	34.0	121	66.1
Copper	7440-50-8	E440/VA	0.50	mg/kg		2730	8460	5960	4470	3400
Iron	7439-89-6	E440/VA	50	mg/kg		63700	74700	55400	57400	56100
Lead	7439-92-1	E440/VA	0.50	mg/kg		455	733	3840	510	1960
Lithium	7439-93-2	E440/VA	2.0	mg/kg		27.2	32.6	23.2	38.9	27.2
Magnesium	7439-95-4	E440/VA	20	mg/kg		11800	11400	11600	12000	12200
Manganese	7439-96-5	E440/VA	1.0	mg/kg		868	833	780	986	833
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0832	0.0816	11.3	0.0582
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		19.2	19.1	15.6	22.1	21.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		208	151	156	396	129
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9650	10000	10000	9160	10000
Potassium	7440-09-7	E440/VA	100	mg/kg		6230	5880	5940	5940	5670
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.38	0.43	0.34	0.44	0.33
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.35	4.33	4.31	5.50	4.52
Sodium	7440-23-5	E440/VA	50	mg/kg		16900	16200	16800	16800	16700
Strontium	7440-24-6	E440/VA	0.50	mg/kg		285	302	289	302	312
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11600	12000	12200	12200	11900

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2329-A-1	BA2329-A-2	BA2329-A-3	BA2329-A-4	BA2329-A-5
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
						VA23B7341-001	VA23B7341-002	VA23B7341-003	VA23B7341-004	VA23B7341-005
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	0.087	0.058	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		127	169	143	183	88.4
Titanium	7440-32-6	E440/VA	1.0	mg/kg		220	285	260	294	324
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		8.72	16.6	9.77	11.0	14.1
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.70	3.94	4.00	4.30	4.02
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		49.6	55.8	51.0	52.2	55.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3830	9050	4940	4860	3280
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.8	1.7	1.9	2.2	1.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.9	12.0	12.0	12.0
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.98	6.69	8.37	7.59	7.38
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.50	6.57	6.47	6.64	6.47
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.62	2.43	2.52	2.45	2.52
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.131	0.123	0.136	0.804	0.138
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2410	2360	2370	2280	2360
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.12	3.20	3.32	1.24	1.22
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.26	1.28	1.42	1.02	0.935
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		132	127	129	120	130
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.43	0.47	0.42	0.30	0.48
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2329-A-1	BA2329-A-2	BA2329-A-3	BA2329-A-4	BA2329-A-5
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B7341-001	VA23B7341-002	VA23B7341-003	VA23B7341-004	VA23B7341-005
						Result	Result	Result	Result	Result
TCLP Metals										
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		21.0	18.6	23.5	13.0	24.1
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2329-A-6	BA2329-A-7	BA2329-A-8	BA2329-A-9	BA2329-A-10
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
						VA23B7341-006	VA23B7341-007	VA23B7341-008	VA23B7341-009	VA23B7341-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		20.4	18.5	19.8	19.6	20.5
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.0	12.0	12.0	12.1	12.0
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		30600	32500	41000	33700	34100
Antimony	7440-36-0	E440/VA	0.10	mg/kg		99.2	110	92.1	83.2	97.0
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		27.3	29.8	26.2	27.8	39.4
Barium	7440-39-3	E440/VA	0.50	mg/kg		467	633	590	594	653
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.36	0.37	0.35	0.39	0.39
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		7.14	7.42	8.51	7.21	8.54
Boron	7440-42-8	E440/VA	5.0	mg/kg		246	207	171	172	199
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		14.9	11.3	14.2	10.2	10.7
Calcium	7440-70-2	E440/VA	50	mg/kg		158000	154000	142000	148000	155000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		195	148	208	142	183
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		169	54.4	188	335	40.0
Copper	7440-50-8	E440/VA	0.50	mg/kg		7170	2620	20500	1770	3470
Iron	7439-89-6	E440/VA	50	mg/kg		56400	55700	56800	45300	63700
Lead	7439-92-1	E440/VA	0.50	mg/kg		681	535	728	382	592
Lithium	7439-93-2	E440/VA	2.0	mg/kg		33.6	29.3	22.7	25.1	29.5
Magnesium	7439-95-4	E440/VA	20	mg/kg		11600	11600	11000	11800	13000
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1170	742	845	674	813
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0523	<0.0500	<0.0500	0.0666
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		18.9	30.7	16.0	16.0	19.5
Nickel	7440-02-0	E440/VA	0.50	mg/kg		447	289	248	150	192
Phosphorus	7723-14-0	E440/VA	50	mg/kg		10300	9460	7670	8830	9720
Potassium	7440-09-7	E440/VA	100	mg/kg		5680	5850	5240	5920	5840
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.33	0.32	0.36	0.28	0.31
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.39	5.70	10.2	3.17	8.29
Sodium	7440-23-5	E440/VA	50	mg/kg		16200	16600	15100	16700	16700
Strontium	7440-24-6	E440/VA	0.50	mg/kg		361	291	288	288	305
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11400	11600	11600	12500	11800
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	0.051	<0.050	0.068

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2329-A-6	BA2329-A-7	BA2329-A-8	BA2329-A-9	BA2329-A-10
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
						VA23B7341-006	VA23B7341-007	VA23B7341-008	VA23B7341-009	VA23B7341-010
						Result	Result	Result	Result	Result
Metals										
Tin	7440-31-5	E440/VA	2.0	mg/kg		107	99.1	158	92.6	172
Titanium	7440-32-6	E440/VA	1.0	mg/kg		160	225	257	200	243
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		7.88	8.24	6.48	6.08	7.97
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.02	3.84	3.82	3.79	4.11
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		48.4	51.1	51.6	45.1	52.8
Zinc	7440-66-6	E440/VA	2.0	mg/kg		5820	4000	4560	3740	3980
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.8	1.8	2.5	2.2	1.8
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.0	12.0	12.0	12.0	12.0
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.26	7.87	8.56	8.32	8.56
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.60	6.27	6.42	6.45	6.42
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.45	2.43	4.08	2.42	2.48
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.107	0.157	0.159	0.150	0.305
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2310	2310	2270	2260	2270
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		0.842	2.30	1.04	1.12	1.22
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.07	1.20	1.00	1.28	1.35
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		122	128	124	125	125
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.36	0.47	0.40	0.35	0.38
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2329-A-6	BA2329-A-7	BA2329-A-8	BA2329-A-9	BA2329-A-10
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00	19-Jul-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B7341-006	VA23B7341-007	VA23B7341-008	VA23B7341-009	VA23B7341-010
						Result	Result	Result	Result	Result
TCLP Metals										
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		15.2	28.9	33.5	24.5	20.3
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)				Client sample ID	BA2329-A-11	BA2329-A-12	----	----	----
				Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7341-011	VA23B7341-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144/VA	0.25	%	19.8	19.8	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	12.1	12.0	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	33900	35400	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	116	108	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	26.8	27.8	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	614	501	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.42	0.35	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	7.63	11.5	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	246	203	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.0	12.5	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	148000	153000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	218	156	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	348	140	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	10200	2070	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	53600	60300	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	620	1700	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	38.3	30.0	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	12300	11800	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	812	1130	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0519	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	18.5	18.4	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	361	199	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	8490	8510	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5630	5600	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.34	0.36	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.38	4.53	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	16100	15600	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	286	314	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11700	11800	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2329-A-11	BA2329-A-12	----	----	----
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B7341-011	VA23B7341-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Tin	7440-31-5	E440/VA	2.0	mg/kg		233	190	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		436	309	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		39.2	7.22	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.01	4.12	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		47.8	49.9	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3290	4900	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.4	2.3	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.0	12.0	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.76	8.88	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.34	6.62	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.58	2.57	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.190	0.183	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2330	2370	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.37	0.983	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.35	1.18	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		130	125	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.40	0.46	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	----	----	----

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2329-A-11	BA2329-A-12	----	----	----
					Client sampling date / time	19-Jul-2023 09:00	19-Jul-2023 09:00	----	----	----
						VA23B7341-011	VA23B7341-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		24.5	28.9	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	----	----	----

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

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B7341**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Jul-2023 12:20
PO	: VANCO0000051998	Issue Date	: 03-Aug-2023 08:38
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	VA23B7341-001	BA2329-A-1	Antimony	7440-36-0	E440	55.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B7341-001	BA2329-A-1	Chromium	7440-47-3	E440	41.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B7341-001	BA2329-A-1	Cobalt	7440-48-4	E440	47.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23B7341-001	BA2329-A-1	Lead	7439-92-1	E440	151 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-1	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-10	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-11	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-12	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-2	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-3	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-4	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 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 BA2329-A-5	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-6	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-7	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-8	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2329-A-9	E510	19-Jul-2023	02-Aug-2023	28 days	14 days	✓	02-Aug-2023	14 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-1	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-10	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-11	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-12	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 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 BA2329-A-2	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-3	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-4	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-5	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-6	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-7	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-8	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2329-A-9	E440	19-Jul-2023	02-Aug-2023	180 days	14 days	✓	03-Aug-2023	166 days	1 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-1	E144	19-Jul-2023	----	----	----		01-Aug-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 BA2329-A-10	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-11	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-12	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-2	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-3	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-4	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-5	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-6	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-7	E144	19-Jul-2023	----	----	----		01-Aug-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 BA2329-A-8	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2329-A-9	E144	19-Jul-2023	----	----	----		01-Aug-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-1	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-10	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-11	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-12	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-2	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-3	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-4	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 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 BA2329-A-5	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-6	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-7	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-8	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2329-A-9	E108	19-Jul-2023	02-Aug-2023	30 days	14 days	✓	02-Aug-2023	16 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2329-A-1	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2329-A-10	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2329-A-11	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2329-A-12	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 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)										
BA2329-A-2	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-3	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-4	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-5	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-6	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-7	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-8	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2329-A-9	E512	31-Jul-2023	02-Aug-2023	40 days	14 days	✓	02-Aug-2023	26 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2329-A-1	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 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) BA2329-A-10	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-11	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-12	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-2	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-3	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-4	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-5	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-6	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-7	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 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) BA2329-A-8	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2329-A-9	E444	31-Jul-2023	02-Aug-2023	192 days	14 days	✓	02-Aug-2023	179 days	0 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-1	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-10	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-11	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-12	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-2	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-3	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2329-A-4	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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)										
BA2329-A-5	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2329-A-6	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2329-A-7	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2329-A-8	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2329-A-9	EPP444	19-Jul-2023	31-Jul-2023	----	----		----	28 days	12 days	✓

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	1065636	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1065637	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	1065642	1	20	5.0	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1065638	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1065636	2	20	10.0	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1065637	2	20	10.0	10.0	✓
Moisture Content by Gravimetry	E144	1065642	1	20	5.0	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1065638	1	20	5.0	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1066761	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1065636	1	20	5.0	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1066762	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1065637	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	1065642	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1066761	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1066762	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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	: **VA23B7341**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 27-Jul-2023 12:20
PO	: VANCO0000051998	Date Analysis Commenced	: 31-Jul-2023
C-O-C number	: ----	Issue Date	: 03-Aug-2023 08:38
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
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, 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: 1065638)											
VA23B7341-001	BA2329-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	12.0	0.8%	5%	----
Physical Tests (QC Lot: 1065642)											
VA23B7341-001	BA2329-A-1	Moisture	----	E144	0.25	%	21.1	21.0	0.802%	20%	----
Metals (QC Lot: 1065636)											
VA23B7341-001	BA2329-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0509	0.0009	Diff <2x LOR	----
Metals (QC Lot: 1065637)											
VA23B7341-001	BA2329-A-1	Aluminum	7429-90-5	E440	50	mg/kg	34000	31500	7.65%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	100	176	55.0%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	28.7	26.0	9.77%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	558	542	3.09%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.37	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	6.88	6.50	5.63%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	180	210	15.0%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.3	9.62	6.65%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	144000	142000	1.70%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	288	189	41.4%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	70.7	43.5	47.6%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2730	2580	5.70%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	63700	59700	6.45%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	455	3280	151%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	27.2	24.9	8.82%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11800	11400	3.76%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	868	780	10.8%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	19.2	17.2	10.6%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	208	255	20.4%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	9650	8480	12.8%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	6230	5690	9.09%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.27	0.11	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	3.35	3.76	11.5%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	16900	16000	5.37%	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: 1065637) - continued											
VA23B7341-001	BA2329-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	285	277	2.71%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11600	11000	4.72%	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	127	172	30.4%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	220	176	22.4%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	8.72	7.00	21.8%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.70	3.51	5.09%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.6	46.4	6.78%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3830	4220	9.59%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.8	1.0	Diff <2x LOR	----

Qualifiers

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

Method Blank (MB) Report

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

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1065642)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1065636)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1065637)						
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: 1065637) - 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: 1066761)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1066762)						
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: 1065638)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1065642)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1065636)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 1065637)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	108	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	111	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	100	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	107	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	109	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.8	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	110	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	108	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	110	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	109	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	109	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	108	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	109	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: 1065637) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	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	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	104	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	110	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	109	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	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: 1066761)										
VA23B7341-001	BA2329-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.0	50.0	140	----
TCLP Metals (QCLot: 1066762)										
VA23B7341-001	BA2329-A-1	Antimony, TCLP	7440-36-0	E444	5.08 mg/L	5 mg/L	102	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.1	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.5 mg/L	12.5 mg/L	100.0	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.239 mg/L	0.25 mg/L	95.5	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.75 mg/L	10 mg/L	97.5	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.243 mg/L	0.25 mg/L	97.1	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	1.18 mg/L	1.25 mg/L	94.8	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	2.18 mg/L	2.5 mg/L	87.3	50.0	140	----
		Iron, TCLP	7439-89-6	E444	233 mg/L	250 mg/L	93.2	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.85 mg/L	10 mg/L	98.5	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	251 mg/L	250 mg/L	100	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.30 mg/L	2.5 mg/L	92.2	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.82 mg/L	5 mg/L	96.3	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.104 mg/L	0.1 mg/L	104	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.4	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.97 mg/L	5 mg/L	99.5	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.9	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	87.8	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: 1065636)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	96.0	70.0	130	----
Metals (QCLot: 1065637)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	113	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	95.1	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	108	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	110	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	125	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	106	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	108	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	104	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	109	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	107	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	113	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	111	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	109	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	105	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	105	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	118	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----

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: 1065637) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	112	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	101	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF	☐ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	ofetherstonhaugh@covanta.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Request
		☐ 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
	BA2329-A-1	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-2	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-3	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-4	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-5	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-6	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-7	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-8	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-9	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-10	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-11	19-Jul-23	9:00	Soil	X	X		X	1
	BA2329-A-12	19-Jul-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23B7341

Telephone : +1 604 253 4188

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	26-Jul-23	9:00		7/27	2:20P	20 °C				