metrovancouver

Bottom Ash Data

2023 Week 33

The following analytical report represents bottom ash composite results for week 33 of 2023 (August 13, 2023 to August 19, 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	: **VA23B9421**	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	: 21-Aug-2023 12:00
PO	: VANCO0000051998	Date Analysis Commenced	: 22-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 08:04
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	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.

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2333-A-1	BA2333-A-2	BA2333-A-3	BA2333-A-4	BA2333-A-5
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
						VA23B9421-001	VA23B9421-002	VA23B9421-003	VA23B9421-004	VA23B9421-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		24.7	23.7	22.9	24.2	23.7
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.1	11.8	11.5	11.8	11.9
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		29800	33000	28700	30400	33400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		116	102	106	103	116
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		21.2	19.6	20.2	23.2	20.7
Barium	7440-39-3	E440/VA	0.50	mg/kg		645	613	596	624	622
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.33	0.33	0.30	0.34	0.30
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.17	6.01	6.37	8.07	6.38
Boron	7440-42-8	E440/VA	5.0	mg/kg		172	149	155	224	153
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.7	11.4	12.8	16.1	10.0
Calcium	7440-70-2	E440/VA	50	mg/kg		156000	153000	148000	164000	157000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		138	127	181	1070	579
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		60.6	44.7	76.9	90.8	82.8
Copper	7440-50-8	E440/VA	0.50	mg/kg		8070	4840	1580	4400	2090
Iron	7439-89-6	E440/VA	50	mg/kg		69600	43600	62000	53200	76500
Lead	7439-92-1	E440/VA	0.50	mg/kg		440	381	346	479	553
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.1	23.5	27.2	26.2	23.7
Magnesium	7439-95-4	E440/VA	20	mg/kg		11400	11300	11600	12400	11700
Manganese	7439-96-5	E440/VA	1.0	mg/kg		846	797	898	1320	937
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.229	0.184	0.201	0.229	0.149
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		23.6	23.4	26.7	28.4	23.1
Nickel	7440-02-0	E440/VA	0.50	mg/kg		309	170	158	298	712
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8800	10000	8790	10800	8670
Potassium	7440-09-7	E440/VA	100	mg/kg		5900	5380	5590	6200	5380
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.39	0.32	0.35	0.34	0.36
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.54	2.46	3.58	4.30	4.90
Sodium	7440-23-5	E440/VA	50	mg/kg		15700	15700	16400	17400	15500
Strontium	7440-24-6	E440/VA	0.50	mg/kg		358	302	299	320	307

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2333-A-1	BA2333-A-2	BA2333-A-3	BA2333-A-4	BA2333-A-5
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
						VA23B9421-001	VA23B9421-002	VA23B9421-003	VA23B9421-004	VA23B9421-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10700	9700	10400	11000	10700
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		145	113	94.7	152	107
Titanium	7440-32-6	E440/VA	1.0	mg/kg		304	266	311	181	222
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		6.31	5.10	5.33	5.54	7.72
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.75	2.67	2.66	2.83	2.77
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		40.5	37.4	36.1	44.3	38.1
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3960	3120	3530	7210	4110
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.5	2.8	2.0	3.3	3.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.1	12.1	12.2	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.60	11.1	9.90	9.89	9.87
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.43	6.70	6.56	6.43	6.72
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		1.88	2.12	2.04	1.96	2.02
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.157	0.126	0.418	0.248	0.231
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2100	2230	2130	2280	2370
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		1.56	1.87	0.811	1.21	0.958
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.08	1.03	1.15	0.813	0.827
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		125	126	125	130	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		0.37	0.32	0.42	0.53	0.38
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2333-A-1	BA2333-A-2	BA2333-A-3	BA2333-A-4	BA2333-A-5
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9421-001	VA23B9421-002	VA23B9421-003	VA23B9421-004	VA23B9421-005
						Result	Result	Result	Result	Result
TCLP Metals										
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
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		25.4	15.2	26.5	21.0	12.2
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/Solid
(Matrix: Soil/Solid)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2333-A-6	BA2333-A-7	BA2333-A-8	BA2333-A-9	BA2333-A-10
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
						VA23B9421-006	VA23B9421-007	VA23B9421-008	VA23B9421-009	VA23B9421-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		23.5	22.8	22.1	23.5	23.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.6	11.4	11.6	12.0	11.8
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		30200	41200	40300	35800	36600
Antimony	7440-36-0	E440/VA	0.10	mg/kg		103	139	106	100	148
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.6	22.7	20.6	17.8	23.0
Barium	7440-39-3	E440/VA	0.50	mg/kg		572	680	651	652	577
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.30	0.30	0.35	0.30	0.32
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.15	7.34	7.08	6.41	6.22
Boron	7440-42-8	E440/VA	5.0	mg/kg		122	194	144	208	222
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		10.9	10.8	9.56	8.66	9.67
Calcium	7440-70-2	E440/VA	50	mg/kg		158000	160000	148000	145000	150000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		146	222	147	157	155
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		132	57.8	98.4	35.1	855
Copper	7440-50-8	E440/VA	0.50	mg/kg		5180	9510	4880	2760	3090
Iron	7439-89-6	E440/VA	50	mg/kg		48500	52200	69400	54400	55400
Lead	7439-92-1	E440/VA	0.50	mg/kg		3600	737	390	368	2670
Lithium	7439-93-2	E440/VA	2.0	mg/kg		37.3	30.6	27.7	23.0	40.0
Magnesium	7439-95-4	E440/VA	20	mg/kg		11200	11600	11100	11500	10800
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1040	865	1020	793	869
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.284	0.285	0.192	0.148	0.163
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		22.9	29.5	23.7	21.2	24.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg		136	183	154	249	940
Phosphorus	7723-14-0	E440/VA	50	mg/kg		10200	10800	8100	9040	9850
Potassium	7440-09-7	E440/VA	100	mg/kg		5970	5920	5770	5660	5940
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.33	0.31	0.36	0.30	0.33
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.72	3.40	8.82	8.48	6.04
Sodium	7440-23-5	E440/VA	50	mg/kg		16000	16100	15700	15900	15800
Strontium	7440-24-6	E440/VA	0.50	mg/kg		299	498	289	287	307
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11700	10800	10600	9500	9500

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2333-A-6	BA2333-A-7	BA2333-A-8	BA2333-A-9	BA2333-A-10
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
						VA23B9421-006	VA23B9421-007	VA23B9421-008	VA23B9421-009	VA23B9421-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		116	97.6	224	100	520
Titanium	7440-32-6	E440/VA	1.0	mg/kg		187	290	312	264	260
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		4.59	5.25	5.93	6.17	5.03
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.84	2.85	2.62	2.43	2.56
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		39.7	36.8	47.0	36.4	38.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg		6500	4560	4570	5640	5840
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.6	2.6	2.3	1.9	2.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.1	12.1	12.1	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.56	9.56	9.54	9.50	9.51
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.37	6.29	6.50	6.68	7.54
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		1.87	1.82	1.89	1.81	1.93
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.188	0.179	0.196	0.359	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2170	1990	2110	1980	1980
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		1.19	1.58	1.94	0.988	0.478
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.03	1.04	1.02	0.934	0.693
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		121	128	135	115	100
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		0.37	0.64	0.57	0.31	<0.25
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

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2333-A-6	BA2333-A-7	BA2333-A-8	BA2333-A-9	BA2333-A-10
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00	16-Aug-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9421-006	VA23B9421-007	VA23B9421-008	VA23B9421-009	VA23B9421-010
						Result	Result	Result	Result	Result
TCLP Metals										
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
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		22.1	30.6	28.1	10.4	0.57
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2333-A-11	BA2333-A-12	----	----	----
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9421-011	VA23B9421-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.7	23.1	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.5	11.8	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		43000	37300	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		124	101	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		17.9	19.8	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		576	612	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.30	0.30	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		5.99	7.68	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		201	158	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		42.4	9.52	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		144000	152000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		142	164	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		80.9	103	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		1420	18000	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		41000	48000	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		1050	2200	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		19.7	28.1	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		10600	10800	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1150	901	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.133	0.135	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		22.0	161	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		132	129	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8660	8960	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		5310	5270	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.24	0.26	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.63	2.76	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		15200	14600	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		267	307	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		8900	9700	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2333-A-11	BA2333-A-12	----	----	----
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9421-011	VA23B9421-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		656	90.0	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		391	282	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		3.90	5.44	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.52	2.54	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		35.9	43.1	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		26700	3070	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.4	2.4	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.0	12.1	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.97	9.44	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.40	6.68	----	----	----
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		2.10	1.98	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.152	0.144	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2150	2170	----	----	----
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		2.00	0.692	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.870	0.956	----	----	----
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		125	121	----	----	----
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		1.08	0.35	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2333-A-11	BA2333-A-12	----	----	----
					Client sampling date / time	16-Aug-2023 09:00	16-Aug-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9421-011	VA23B9421-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
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	----	----	----
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		25.3	14.9	----	----	----
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	: **VA23B9421**	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	: 21-Aug-2023 12:00
PO	: VANCO0000051998	Issue Date	: 31-Aug-2023 08:01
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	Anonymous	Anonymous	Chromium	7440-47-3	E440	31.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-1	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-10	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-11	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-12	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-2	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-3	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-4	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-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
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-5	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-6	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-7	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-8	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2333-A-9	E510	16-Aug-2023	26-Aug-2023	28 days	10 days	✓	28-Aug-2023	28 days	12 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-1	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-10	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-11	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-12	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-2	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-3	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-4	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-5	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-6	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-7	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-8	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2333-A-9	E440	16-Aug-2023	26-Aug-2023	180 days	10 days	✓	29-Aug-2023	180 days	13 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-1	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-10	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-11	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-12	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-2	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-3	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-4	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-5	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-6	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-7	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-8	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2333-A-9	E144	16-Aug-2023	----	----	----		25-Aug-2023	----	9 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-1	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-10	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-11	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-12	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-2	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-3	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-4	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 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
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-5	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-6	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-7	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-8	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2333-A-9	E108	16-Aug-2023	26-Aug-2023	30 days	10 days	✓	28-Aug-2023	30 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2333-A-1	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2333-A-10	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2333-A-11	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2333-A-12	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 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)										
BA2333-A-2	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-3	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-4	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-5	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-6	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-7	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-8	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA2333-A-9	E512	22-Aug-2023	24-Aug-2023	35 days	8 days	✓	24-Aug-2023	35 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2333-A-1	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 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) BA2333-A-10	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-11	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-12	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-2	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-3	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-4	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-5	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-6	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-7	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 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) BA2333-A-8	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2333-A-9	E444	22-Aug-2023	24-Aug-2023	187 days	8 days	✓	24-Aug-2023	187 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-1	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-10	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-11	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-12	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-2	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-3	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-4	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 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) BA2333-A-5	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-6	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-7	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-8	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2333-A-9	EPP444	16-Aug-2023	22-Aug-2023	----	----		----	28 days	7 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	1104812	1	14	7.1	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1104813	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	1104815	1	16	6.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1104814	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1104812	2	14	14.2	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1104813	2	14	14.2	10.0	✓
Moisture Content by Gravimetry	E144	1104815	1	16	6.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1104814	1	17	5.8	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1100782	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1104812	1	14	7.1	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1100787	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1104813	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	1104815	1	16	6.2	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1100782	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1100787	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	: **VA23B9421**	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	: 21-Aug-2023 12:00
PO	: VANCO0000051998	Date Analysis Commenced	: 22-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 08:01
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	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: 1104814)											
VA23B9354-017	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.61	8.26	4.1%	5%	----
Physical Tests (QC Lot: 1104815)											
VA23B9354-017	Anonymous	Moisture	----	E144	0.25	%	7.89	8.48	7.21%	20%	----
Metals (QC Lot: 1104812)											
VA23B9354-017	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1104813)											
VA23B9354-017	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	10400	12100	14.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.12	0.11	0.005	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	1.54	1.69	9.67%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	23.6	26.6	11.7%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.13	0.14	0.01	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	0.033	0.031	0.002	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	8400	9370	11.0%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	28.8	20.9	31.5%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	5.54	6.27	12.3%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	19.0	21.2	11.1%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	17000	18700	9.54%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	1.41	1.03	0.39	Diff <2x LOR	----
		Lithium	7439-93-2	E440	2.0	mg/kg	3.2	3.6	0.4	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	4450	5150	14.6%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	223	251	11.7%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.42	0.31	0.11	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	12.9	14.4	10.5%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	299	324	25	Diff <2x LOR	----
		Potassium	7440-09-7	E440	100	mg/kg	320	360	40	Diff <2x LOR	----
		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	488	561	13.8%	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: 1104813) - continued											
VA23B9354-017	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	30.6	36.8	18.5%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		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	1430	1550	7.66%	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	0.165	0.184	0.019	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	61.1	67.0	9.21%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	18.8	20.7	9.50%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	4.9	5.8	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: 1104815)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1104812)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1104813)						
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: 1104813) - 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: 1100782)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1100787)						
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: 1104814)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
Physical Tests (QCLot: 1104815)									
Moisture	----	E144	0.25	%	50 %	102	90.0	110	----
Metals (QCLot: 1104812)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.8	80.0	120	----
Metals (QCLot: 1104813)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	90.4	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.4	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.2	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.8	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	98.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	82.4	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	94.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	90.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	93.1	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	90.7	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	85.9	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	93.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.7	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	95.9	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.9	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	92.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.0	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	90.9	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	80.8	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.5	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: 1104813) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	89.7	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	91.8	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	90.2	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	84.2	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	95.3	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.5	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	90.8	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: 1100782)										
VA23B9421-001	BA2333-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	102	50.0	140	----
TCLP Metals (QCLot: 1100787)										
VA23B9421-001	BA2333-A-1	Antimony, TCLP	7440-36-0	E444	4.03 mg/L	5 mg/L	80.5	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.4 mg/L	5 mg/L	88.7	50.0	140	----
		Barium, TCLP	7440-39-3	E444	10.5 mg/L	12.5 mg/L	84.0	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.199 mg/L	0.25 mg/L	79.5	50.0	140	----
		Boron, TCLP	7440-42-8	E444	7.62 mg/L	10 mg/L	76.2	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.206 mg/L	0.25 mg/L	82.2	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	1.05 mg/L	1.25 mg/L	84.3	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	1.92 mg/L	2.5 mg/L	76.8	50.0	140	----
		Iron, TCLP	7439-89-6	E444	201 mg/L	250 mg/L	80.5	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.26 mg/L	10 mg/L	82.6	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	208 mg/L	250 mg/L	83.3	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.06 mg/L	2.5 mg/L	82.5	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.04 mg/L	5 mg/L	80.9	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.065 mg/L	0.1 mg/L	65.3	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.1 mg/L	5 mg/L	82.2	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.19 mg/L	5 mg/L	83.9	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.63 mg/L	0.75 mg/L	84.1	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	0.7 mg/L	1 mg/L	69.9	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: 1104812)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 1104813)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	91.7	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	96.1	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	95.0	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	114	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	110	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	109	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	97.2	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	93.1	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	96.7	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	99.4	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	93.8	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	96.1	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	92.5	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	107	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.7	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	90.2	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	85.2	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Qualifier
Metals (QCLot: 1104813) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	92.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	99.3	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	93.6	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	86.8	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

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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
	BA2333-A-1	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-2	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-3	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-4	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-5	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-6	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-7	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-8	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-9	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-10	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-11	16-Aug-23	9:00	Soil	X	X		X	1
	BA2333-A-12	16-Aug-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23B9421

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
	21-Aug-23	0800			1215	22 °C		08/21/23		

GENF 20.00 Front