metrovancouver

Bottom Ash Data

2023 Week 46

The following analytical report represents bottom ash composite results for week 46 of 2023 (November 12, 2023 to November 18, 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	: **VA23C7897**	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	: 20-Nov-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 23-Nov-2023
C-O-C number	: ----	Issue Date	: 28-Nov-2023 09:09
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*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2346-A-1	BA2346-A-2	BA2346-A-3	BA2346-A-4	BA2346-A-5
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
						VA23C7897-001	VA23C7897-002	VA23C7897-003	VA23C7897-004	VA23C7897-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		23.2	24.5	23.3	24.2	24.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.3	10.9	11.4	11.4	11.4
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		37300	48300	38600	35400	42400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		132	135	105	123	113
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		18.9	19.1	30.9	23.5	18.2
Barium	7440-39-3	E440/VA	0.50	mg/kg		621	542	598	417	447
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.40	0.43	0.38	0.40	0.38
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		28.3	7.57	6.28	12.7	7.14
Boron	7440-42-8	E440/VA	5.0	mg/kg		223	248	265	248	179
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		8.23	9.19	9.00	10.4	11.2
Calcium	7440-70-2	E440/VA	50	mg/kg		164000	164000	153000	177000	160000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		128	129	178	150	183
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		162	33.4	97.4	70.9	186
Copper	7440-50-8	E440/VA	0.50	mg/kg		1570	3810	6360	1800	2250
Iron	7439-89-6	E440/VA	50	mg/kg		59500	49600	68500	43500	47300
Lead	7439-92-1	E440/VA	0.50	mg/kg		384	701	3100	455	570
Lithium	7439-93-2	E440/VA	2.0	mg/kg		42.2	31.8	29.7	27.0	44.2
Magnesium	7439-95-4	E440/VA	20	mg/kg		12500	13900	11000	13800	12500
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1000	922	1040	965	759
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0590	<0.0500	<0.0500	0.0724
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		30.1	32.0	29.3	34.1	85.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg		140	157	189	164	134
Phosphorus	7723-14-0	E440/VA	50	mg/kg		11200	10900	9740	12600	11300
Potassium	7440-09-7	E440/VA	100	mg/kg		5520	6520	5100	6240	6330
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.26	0.36	0.30	0.36	0.40
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.64	5.15	3.08	4.50	3.23
Sodium	7440-23-5	E440/VA	50	mg/kg		15900	17100	14600	16500	17900
Strontium	7440-24-6	E440/VA	0.50	mg/kg		308	370	317	388	331

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2346-A-1	BA2346-A-2	BA2346-A-3	BA2346-A-4	BA2346-A-5
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
						VA23C7897-001	VA23C7897-002	VA23C7897-003	VA23C7897-004	VA23C7897-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12300	13600	11600	13500	12900
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	0.067	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		90.2	97.0	98.5	136	100
Titanium	7440-32-6	E440/VA	1.0	mg/kg		324	516	326	254	376
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		5.67	5.26	5.22	6.89	4.17
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.17	3.23	3.03	3.50	3.73
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		43.9	42.9	41.9	44.0	48.8
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3930	4910	4050	3960	3370
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.1	2.3	2.8	3.1	2.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.8	11.9	11.9	12.0	12.0
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		7.68	8.24	8.03	8.23	8.39
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.92	2.92	2.92	2.92	2.92
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.47	6.45	6.53	6.50	6.64
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		1.91	1.80	1.91	1.94	2.03
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.117	0.112	0.123	0.109	0.101
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2050	2060	2120	2070	2140
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		0.697	1.61	2.18	0.720	0.822
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.780	1.07	0.960	0.804	1.01
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		112	115	116	112	118
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	0.32	0.36	0.44	0.34
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	BA2346-A-1	BA2346-A-2	BA2346-A-3	BA2346-A-4	BA2346-A-5
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7897-001	VA23C7897-002	VA23C7897-003	VA23C7897-004	VA23C7897-005
						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		19.8	35.6	17.1	23.1	11.6
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	BA2346-A-6	BA2346-A-7	BA2346-A-8	BA2346-A-9	BA2346-A-10
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
						VA23C7897-006	VA23C7897-007	VA23C7897-008	VA23C7897-009	VA23C7897-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		22.4	22.8	24.6	22.6	23.1
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.5	11.3	11.4	11.4	11.5
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		45400	40700	48900	34000	48500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		106	109	104	116	133
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		17.2	24.1	17.4	17.0	17.6
Barium	7440-39-3	E440/VA	0.50	mg/kg		506	602	637	651	588
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.36	0.38	0.41	0.42	0.40
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		5.62	7.30	6.22	5.95	8.94
Boron	7440-42-8	E440/VA	5.0	mg/kg		198	189	203	199	215
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		9.93	8.73	8.13	7.83	9.86
Calcium	7440-70-2	E440/VA	50	mg/kg		149000	158000	165000	157000	165000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		155	155	188	139	142
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		41.5	99.3	155	240	41.1
Copper	7440-50-8	E440/VA	0.50	mg/kg		3970	2190	1180	22400	1180
Iron	7439-89-6	E440/VA	50	mg/kg		68100	53600	54900	42000	53700
Lead	7439-92-1	E440/VA	0.50	mg/kg		1070	317	330	346	646
Lithium	7439-93-2	E440/VA	2.0	mg/kg		26.0	25.2	25.5	68.6	93.4
Magnesium	7439-95-4	E440/VA	20	mg/kg		12200	12700	12800	12800	12700
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1030	849	796	747	829
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.116	0.0753	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		25.0	34.3	35.0	33.3	35.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		154	177	591	370	142
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9100	11700	10600	10100	10800
Potassium	7440-09-7	E440/VA	100	mg/kg		5220	5620	5820	5040	5970
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.33	0.25	0.26	0.40	0.28
Silver	7440-22-4	E440/VA	0.10	mg/kg		3.52	3.59	4.00	4.04	16.6
Sodium	7440-23-5	E440/VA	50	mg/kg		14000	16000	16200	14700	16900
Strontium	7440-24-6	E440/VA	0.50	mg/kg		320	321	372	318	330
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10800	12000	11800	11500	12400

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2346-A-6	BA2346-A-7	BA2346-A-8	BA2346-A-9	BA2346-A-10
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
						VA23C7897-006	VA23C7897-007	VA23C7897-008	VA23C7897-009	VA23C7897-010
						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		146	114	105	110	93.9
Titanium	7440-32-6	E440/VA	1.0	mg/kg		390	396	384	278	405
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		4.77	4.77	16.5	4.43	5.38
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.85	3.31	3.26	3.24	3.23
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		40.5	46.9	47.7	43.6	42.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg		5060	2890	4760	15100	4060
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.0	2.3	2.7	1.9	2.9
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.9	11.9	12.0	11.9	12.0
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.20	8.36	8.52	8.26	8.39
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.92	2.92	2.92	2.92	2.92
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.65	6.68	6.70	6.73	6.74
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		2.02	2.01	1.97	2.02	1.94
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.091	0.101	0.097	0.084	0.094
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2140	2110	2130	2150	2100
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		0.905	0.651	0.993	0.822	0.947
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.820	0.757	0.849	1.04	0.787
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		119	114	115	114	110
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		0.30	0.29	0.30	0.26	0.32
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	BA2346-A-6	BA2346-A-7	BA2346-A-8	BA2346-A-9	BA2346-A-10
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00	05-Nov-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7897-006	VA23C7897-007	VA23C7897-008	VA23C7897-009	VA23C7897-010
						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		27.2	21.3	11.0	12.9	27.8
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	BA2346-A-11	BA2346-A-12	----	----	----
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	----	----	----
						VA23C7897-011	VA23C7897-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		24.0	24.5	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.5	11.7	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		47200	39400	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		100	115	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		17.9	19.4	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		626	454	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.36	0.38	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.31	7.48	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		182	213	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.1	9.31	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		156000	166000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		149	130	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		74.1	54.1	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		5580	1900	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		66600	51400	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		382	412	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.9	28.7	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		12400	13600	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		1030	825	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		27.1	33.5	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		177	184	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		11200	11800	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		6020	5940	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.30	0.26	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		7.91	4.44	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		16700	14800	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		685	348	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11900	12900	----	----	----

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2346-A-11	BA2346-A-12	----	----	----
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	----	----	----
						VA23C7897-011	VA23C7897-012	--------	--------	--------
						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		106	244	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		496	351	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		6.85	5.78	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.14	3.64	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		41.6	44.9	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4150	3100	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.3	2.9	----	----	----
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		8.45	8.67	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.92	2.92	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.77	6.93	----	----	----
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		2.09	2.03	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.077	0.136	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2160	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		0.642	1.13	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.918	0.887	----	----	----
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		114	114	----	----	----
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		0.30	0.28	----	----	----
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	BA2346-A-11	BA2346-A-12	----	----	----
					Client sampling date / time	05-Nov-2023 09:00	05-Nov-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C7897-011	VA23C7897-012	--------	--------	--------
						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		12.8	9.47	----	----	----
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	: **VA23C7897**	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	: 20-Nov-2023 13:00
PO	: VANCO0000051998	Issue Date	: 28-Nov-2023 09:10
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	VA23C7897-001	BA2346-A-1	Bismuth	7440-69-9	E440	126 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7897-001	BA2346-A-1	Chromium	7440-47-3	E440	40.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7897-001	BA2346-A-1	Cobalt	7440-48-4	E440	75.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7897-001	BA2346-A-1	Copper	7440-50-8	E440	42.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7897-001	BA2346-A-1	Manganese	7439-96-5	E440	33.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C7897-001	BA2346-A-1	Nickel	7440-02-0	E440	48.2 % 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 : Analytical Method / 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 BA2346-A-1	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-10	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-11	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-12	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-2	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-3	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-4	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2346-A-5	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-6	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-7	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-8	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2346-A-9	E510	05-Nov-2023	27-Nov-2023	28 days	22 days	✓	27-Nov-2023	28 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-1	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-10	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-11	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-12	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2346-A-2	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-3	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-4	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-5	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-6	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-7	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-8	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2346-A-9	E440	05-Nov-2023	27-Nov-2023	180 days	22 days	✓	28-Nov-2023	180 days	23 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-1	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2346-A-10	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-11	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-12	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-2	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-3	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-4	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-5	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-6	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-7	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2346-A-8	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2346-A-9	E144	05-Nov-2023	----	----	----		25-Nov-2023	----	20 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-1	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-10	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-11	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-12	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-2	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-3	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-4	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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 BA2346-A-5	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-6	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-7	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-8	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2346-A-9	E108	05-Nov-2023	27-Nov-2023	30 days	22 days	✓	27-Nov-2023	30 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-1	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-10	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-11	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-12	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2346-A-2	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-3	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-4	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-5	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-6	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-7	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-8	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2346-A-9	E512	23-Nov-2023	27-Nov-2023	46 days	22 days	✓	27-Nov-2023	46 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-1	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2346-A-10	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-11	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-12	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-2	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-3	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-4	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-5	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-6	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-7	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / 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) BA2346-A-8	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2346-A-9	E444	23-Nov-2023	27-Nov-2023	198 days	22 days	✓	27-Nov-2023	198 days	22 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-1	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-10	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-11	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-12	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-2	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-3	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-4	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-5	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-6	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-7	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-8	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2346-A-9	EPP444	05-Nov-2023	23-Nov-2023	----	----		----	28 days	18 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	1252787	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1252788	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1252790	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1252789	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1252787	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1252788	2	19	10.5	10.0	✓
Moisture Content by Gravimetry	E144	1252790	1	19	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1252789	1	19	5.2	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1254339	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1252787	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1254340	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1252788	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	1252790	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1254339	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1254340	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	: **VA23C7897**	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	: 20-Nov-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 23-Nov-2023
C-O-C number	: ----	Issue Date	: 28-Nov-2023 09:09
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*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1252789)											
VA23C7897-001	BA2346-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	10.9	3.6%	5%	----
Physical Tests (QC Lot: 1252790)											
VA23C7897-001	BA2346-A-1	Moisture	----	E144	0.25	%	23.2	23.7	2.17%	20%	----
Metals (QC Lot: 1252787)											
VA23C7897-001	BA2346-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1252788)											
VA23C7897-001	BA2346-A-1	Aluminum	7429-90-5	E440	50	mg/kg	37300	33400	11.1%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	132	101	26.7%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	18.9	16.6	13.3%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	621	620	0.101%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.53	0.13	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	28.3	6.42	126%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	223	236	5.87%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	8.23	8.32	1.01%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	164000	170000	4.00%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	128	193	40.2%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	162	73.1	75.4%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1570	2420	42.6%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	59500	51500	14.6%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	384	506	27.6%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	42.2	39.3	7.19%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12500	14500	14.9%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1000	719	33.2%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	30.1	34.2	12.7%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	140	229	48.2%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	11200	11200	0.0389%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5520	5600	1.49%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.35	0.09	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	3.64	3.46	4.97%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	15900	16000	0.466%	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: 1252788) - continued											
VA23C7897-001	BA2346-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	308	334	7.99%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12300	11600	6.07%	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	90.2	91.9	1.83%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	324	247	27.1%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	5.67	5.16	9.51%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.17	2.88	9.36%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	43.9	41.0	6.72%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3930	3650	7.37%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.1	1.7	0.4	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: 1252790)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1252787)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1252788)						
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: 1252788) - 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: 1254339)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1254340)						
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: 1252789)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 1252790)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1252787)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	120	80.0	120	----
Metals (QCLot: 1252788)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	107	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	103	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.3	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.0	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.8	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	106	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	111	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	109	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.5	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	88.1	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	107	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: 1252788) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.7	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	94.6	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: 1254339)										
VA23C7897-001	BA2346-A-1	Mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	109	50.0	140	----
TCLP Metals (QCLot: 1254340)										
VA23C7897-001	BA2346-A-1	Antimony, TCLP	7440-36-0	E444	5.21 mg/L	5 mg/L	104	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.3 mg/L	12.5 mg/L	106	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.260 mg/L	0.25 mg/L	104	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.6 mg/L	10 mg/L	106	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.252 mg/L	0.25 mg/L	101	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.24 mg/L	1.25 mg/L	99.7	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	2.35 mg/L	2.5 mg/L	94.0	50.0	140	----
		Iron, TCLP	7439-89-6	E444	248 mg/L	250 mg/L	99.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	276 mg/L	250 mg/L	110	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.44 mg/L	2.5 mg/L	97.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.11 mg/L	5 mg/L	102	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.084 mg/L	0.1 mg/L	84.1	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.21 mg/L	5 mg/L	104	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	103	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	0.8 mg/L	1 mg/L	81.2	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 Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					Qualifier
Metals (QCLot: 1252787)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	112	70.0	130	----
Metals (QCLot: 1252788)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	102	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	118	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	132	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.3	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	118	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	105	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	115	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	118	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	117	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	99.7	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	98.8	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	121	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: 1252788) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	97.2	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.0	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	99.0	70.0	130	----

Chain of Custody / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____ Page 1 of 1

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

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

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

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

Service Requested (Rush for routine analysis subject to availability)

- (●) Regular (Standard Turnaround Times - Business Days)
- ( ) Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
- ( ) Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
- ( ) Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Lab Work Order # (lab use only): 7897

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
	BA2346-A-1	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-2	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-3	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-4	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-5	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-6	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-7	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-8	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-9	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-10	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-11	15-Nov-23	9:00	Soil	X	X		X	1
	BA2346-A-12	15-Nov-23	9:00	Soil	X	X		X	1

Special Instructions / R

E-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Environmental Division
Vancouver
Work Order Reference
VA23C7897

Telephone : +1 604 253 4188

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.

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

PMENT REL EASE (client use)

Date (dd-mmm-yy): NOV 20/23 Time (hh-mm): 900

SHIPMENT RECEPTION (lab use only)

Received by: | Date: | Time: | Temperature: 19 °C

SHIPMENT VERIFICATION (lab use only)

Verified by: AB | Date: 11/20/23 | Time: 1800 | Observations: Yes / No ? If Yes add SIF

GENF 20.00 Front