metrovancouver

Bottom Ash Data

2023 Week 52

The following analytical report represents bottom ash composite results for week 52 of 2023 (December 24, 2023 to December 30 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	: **VA24A0289**	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	: 04-Jan-2024 14:25
PO	: VANCO0000051999	Date Analysis Commenced	: 05-Jan-2024
C-O-C number	: ----	Issue Date	: 10-Jan-2024 23:19
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
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2352-A-1	BA2352-A-2	BA2352-A-3	BA2352-A-4	BA2352-A-5
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
						VA24A0289-001	VA24A0289-002	VA24A0289-003	VA24A0289-004	VA24A0289-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		18.9	19.8	20.1	20.0	18.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.4	12.4	12.4	12.3	12.4
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		41900	38400	36200	38100	35800
Antimony	7440-36-0	E440/VA	0.10	mg/kg		187	204	199	223	216
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		19.4	23.7	21.6	21.8	24.0
Barium	7440-39-3	E440/VA	0.50	mg/kg		565	553	540	498	540
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.50	0.50	0.39	0.39	0.38
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		13.6	18.3	17.1	16.2	17.2
Boron	7440-42-8	E440/VA	5.0	mg/kg		208	167	164	213	162
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		12.1	15.2	14.4	14.8	14.6
Calcium	7440-70-2	E440/VA	50	mg/kg		153000	168000	172000	173000	171000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		142	149	246	200	167
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		67.1	76.7	86.0	245	268
Copper	7440-50-8	E440/VA	0.50	mg/kg		2040	1440	3360	2630	4710
Iron	7439-89-6	E440/VA	50	mg/kg		53400	43000	42200	51400	39600
Lead	7439-92-1	E440/VA	0.50	mg/kg		300	395	432	419	344
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.4	33.4	39.5	34.0	122
Magnesium	7439-95-4	E440/VA	20	mg/kg		11500	12300	11200	11200	11200
Manganese	7439-96-5	E440/VA	1.0	mg/kg		953	593	779	702	1310
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0672	0.0855	0.115	0.0895	0.115
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		23.3	24.5	42.4	29.2	25.8
Nickel	7440-02-0	E440/VA	0.50	mg/kg		241	427	281	119	141
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8140	9800	10300	10300	8790
Potassium	7440-09-7	E440/VA	100	mg/kg		5660	6950	7150	6860	6800
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.61	0.75	0.64	0.64	0.62
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.22	5.91	5.90	7.30	5.48
Sodium	7440-23-5	E440/VA	50	mg/kg		14100	16700	17300	15500	16300
Strontium	7440-24-6	E440/VA	0.50	mg/kg		279	301	286	292	368

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2352-A-1	BA2352-A-2	BA2352-A-3	BA2352-A-4	BA2352-A-5
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
						VA24A0289-001	VA24A0289-002	VA24A0289-003	VA24A0289-004	VA24A0289-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11500	12700	12500	12200	12300
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		194	148	161	171	167
Titanium	7440-32-6	E440/VA	1.0	mg/kg		417	382	358	324	288
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		10.1	13.8	10.9	7.83	8.34
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.96	4.05	4.14	4.50	4.52
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		42.6	46.0	41.0	47.6	44.5
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4560	4780	4070	4190	4280
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.1	1.4	1.6	2.0	2.2
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		10.0	9.43	9.82	10.2	9.74
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.62	9.78	9.78	9.76	9.43
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		1.42	1.36	1.50	1.46	1.44
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1980	1930	1990	2050	1930
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		<0.050	<0.050	<0.050	<0.050	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.517	0.526	0.529	0.566	0.517
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		71.6	70.0	69.6	71.5	79.6
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		<0.25	<0.25	<0.25	<0.25	<0.25
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**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2352-A-1	BA2352-A-2	BA2352-A-3	BA2352-A-4	BA2352-A-5
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
						VA24A0289-001	VA24A0289-002	VA24A0289-003	VA24A0289-004	VA24A0289-005
						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		<0.50	<0.50	<0.50	<0.50	<0.50
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	BA2352-A-6	BA2352-A-7	BA2352-A-8	BA2352-A-9	BA2352-A-10
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
						VA24A0289-006	VA24A0289-007	VA24A0289-008	VA24A0289-009	VA24A0289-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		19.8	19.4	19.4	20.9	20.0
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.4	12.4	12.3	12.4
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		33900	38500	35300	37300	34300
Antimony	7440-36-0	E440/VA	0.10	mg/kg		199	210	210	316	213
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		19.6	20.4	20.3	26.8	22.0
Barium	7440-39-3	E440/VA	0.50	mg/kg		484	555	513	571	532
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.34	0.36	0.36	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		15.8	17.5	15.7	18.5	15.1
Boron	7440-42-8	E440/VA	5.0	mg/kg		170	165	173	205	148
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		13.4	12.7	12.9	21.4	12.8
Calcium	7440-70-2	E440/VA	50	mg/kg		159000	164000	166000	162000	163000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		158	130	137	157	124
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		370	333	113	30.4	82.4
Copper	7440-50-8	E440/VA	0.50	mg/kg		2010	9810	12600	4160	14000
Iron	7439-89-6	E440/VA	50	mg/kg		42400	38400	41600	36200	52900
Lead	7439-92-1	E440/VA	0.50	mg/kg		1030	343	329	18400	940
Lithium	7439-93-2	E440/VA	2.0	mg/kg		30.8	30.2	20.9	22.7	23.0
Magnesium	7439-95-4	E440/VA	20	mg/kg		10800	10700	11000	11700	11000
Manganese	7439-96-5	E440/VA	1.0	mg/kg		701	696	727	718	572
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.148	0.0762	0.0763	0.0790	0.0689
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		24.9	19.5	20.9	24.0	19.0
Nickel	7440-02-0	E440/VA	0.50	mg/kg		113	105	194	178	163
Phosphorus	7723-14-0	E440/VA	50	mg/kg		9980	9160	8130	8770	8460
Potassium	7440-09-7	E440/VA	100	mg/kg		7270	6240	6200	7230	5970
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.57	0.65	0.50	0.64	0.54
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.93	5.85	5.84	5.28	6.14
Sodium	7440-23-5	E440/VA	50	mg/kg		17200	14800	15400	16200	15000
Strontium	7440-24-6	E440/VA	0.50	mg/kg		686	288	299	280	302
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10200	11500	11100	11400	11400

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2352-A-6	BA2352-A-7	BA2352-A-8	BA2352-A-9	BA2352-A-10
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
						VA24A0289-006	VA24A0289-007	VA24A0289-008	VA24A0289-009	VA24A0289-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		0.050	<0.050	<0.050	0.160	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		999	156	146	173	163
Titanium	7440-32-6	E440/VA	1.0	mg/kg		183	341	332	351	296
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		11.1	14.1	10.3	11.6	10.4
Uranium	7440-61-1	E440/VA	0.050	mg/kg		4.17	4.34	3.99	4.11	3.70
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		40.7	43.8	42.8	53.1	43.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3590	6980	4330	5060	3540
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.9	2.0	1.2	1.9	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.0	12.1	12.0	12.1	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.08	9.72	9.70	9.82	9.39
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.50	9.48	9.67	9.76	9.49
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		1.57	1.42	1.37	1.42	1.34
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2040	1930	1890	2020	1820
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		<0.050	<0.050	<0.050	<0.050	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.567	0.508	0.484	0.471	0.479
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		83.7	82.8	74.7	67.6	78.8
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		<0.25	<0.25	<0.25	<0.25	<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	BA2352-A-6	BA2352-A-7	BA2352-A-8	BA2352-A-9	BA2352-A-10
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00	27-Dec-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A0289-006	VA24A0289-007	VA24A0289-008	VA24A0289-009	VA24A0289-010
						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		<0.50	<0.50	<0.50	<0.50	<0.50
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: BA2352-A-11	BA2352-A-12	----	----	----
					Client sampling date / time: 27-Dec-2023 09:00	27-Dec-2023 09:00	----	----	----
					VA24A0289-011	VA24A0289-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144/VA	0.25	%	20.8	19.5	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	12.3	12.4	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	27500	40200	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	203	193	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	21.2	21.6	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	500	463	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.76	0.53	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	15.5	23.7	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	247	138	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	13.2	14.1	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	166000	154000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	1060	136	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	25.6	53.9	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	1330	2960	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	39600	51500	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	355	344	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	21.3	21.3	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10100	10600	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	652	782	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0816	0.0867	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	84.7	23.3	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	888	96.8	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9280	8880	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	6460	7000	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.57	0.59	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	6.71	>55.4	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	14800	16400	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	279	272	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11400	10900	----	----	----

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2352-A-11	BA2352-A-12	----	----	----
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	----	----	----
						VA24A0289-011	VA24A0289-012	--------	--------	--------
						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		146	164	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		206	333	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		9.69	6.10	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.92	3.99	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		41.4	40.8	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		6370	4110	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.4	3.4	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.1	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.99	10.1	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.89	2.89	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		9.69	9.76	----	----	----
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		1.35	1.52	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1890	1990	----	----	----
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		<0.050	<0.050	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.519	0.549	----	----	----
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		71.5	74.4	----	----	----
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		<0.25	<0.25	----	----	----
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	BA2352-A-11	BA2352-A-12	----	----	----
					Client sampling date / time	27-Dec-2023 09:00	27-Dec-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A0289-011	VA24A0289-012	--------	--------	--------
						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		<0.50	<0.50	----	----	----
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	: **VA24A0289**	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	: 04-Jan-2024 14:25
PO	: VANCO0000051999	Issue Date	: 10-Jan-2024 23:19
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	VA24A0289-001	BA2352-A-1	Arsenic	7440-38-2	E440	36.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Chromium	7440-47-3	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Cobalt	7440-48-4	E440	88.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Copper	7440-50-8	E440	62.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Lead	7439-92-1	E440	41.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Nickel	7440-02-0	E440	59.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A0289-001	BA2352-A-1	Titanium	7440-32-6	E440	43.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group : 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 BA2352-A-1	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-10	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-11	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-12	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-2	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-3	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-4	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 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 BA2352-A-5	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-6	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-7	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-8	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2352-A-9	E510	27-Dec-2023	08-Jan-2024	28 days	12 days	✓	09-Jan-2024	28 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-1	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-10	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-11	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-12	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 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 BA2352-A-2	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-3	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-4	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-5	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-6	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-7	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-8	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2352-A-9	E440	27-Dec-2023	08-Jan-2024	180 days	12 days	✓	09-Jan-2024	180 days	13 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-1	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 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 BA2352-A-10	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-11	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-12	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-2	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-3	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-4	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-5	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-6	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-7	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 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 BA2352-A-8	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2352-A-9	E144	27-Dec-2023	----	----	----		05-Jan-2024	----	10 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-1	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-10	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-11	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-12	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-2	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-3	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-4	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 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 BA2352-A-5	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-6	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-7	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-8	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2352-A-9	E108	27-Dec-2023	08-Jan-2024	30 days	12 days	✓	08-Jan-2024	30 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-1	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-10	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-11	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-12	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 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) BA2352-A-2	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-3	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-4	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-5	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-6	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-7	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-8	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2352-A-9	E512	06-Jan-2024	10-Jan-2024	38 days	14 days	✓	10-Jan-2024	38 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-1	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 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) BA2352-A-10	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-11	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-12	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-2	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-3	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-4	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-5	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-6	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-7	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 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) BA2352-A-8	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2352-A-9	E444	06-Jan-2024	10-Jan-2024	190 days	14 days	✓	10-Jan-2024	190 days	14 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-1	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-10	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-11	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-12	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-2	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-3	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-4	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 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) BA2352-A-5	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-6	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-7	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-8	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2352-A-9	EPP444	27-Dec-2023	06-Jan-2024	----	----		----	28 days	10 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	1295714	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1295715	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1295717	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1295716	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1295714	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1295715	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	1295717	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1295716	1	12	8.3	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1298410	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1295714	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1298411	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1295715	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1295717	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1298410	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1298411	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	: **VA24A0289**	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	: 04-Jan-2024 14:25
PO	: VANCO0000051999	Date Analysis Commenced	: 05-Jan-2024
C-O-C number	: ----	Issue Date	: 10-Jan-2024 23:19
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
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1295716)											
VA24A0289-001	BA2352-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.4	12.4	0.1%	5%	----
Physical Tests (QC Lot: 1295717)											
VA24A0289-001	BA2352-A-1	Moisture	----	E144	0.25	%	18.9	19.8	4.67%	20%	----
Metals (QC Lot: 1295714)											
VA24A0289-001	BA2352-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0672	0.0719	0.0047	Diff <2x LOR	----
Metals (QC Lot: 1295715)											
VA24A0289-001	BA2352-A-1	Aluminum	7429-90-5	E440	50	mg/kg	41900	33000	23.9%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	187	208	10.4%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	19.4	28.1	36.8%	30%	DUP-H
		Barium	7440-39-3	E440	0.50	mg/kg	565	498	12.7%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.38	0.12	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	13.6	17.0	22.2%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	208	167	21.9%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	12.1	13.4	10.2%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	153000	170000	10.0%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	142	193	30.8%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	67.1	25.9	88.6%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2040	3880	62.1%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	53400	51500	3.59%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	300	457	41.3%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	25.4	22.1	13.7%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11500	11900	2.98%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	953	935	1.93%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	23.3	21.7	7.05%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	241	131	59.2%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	8140	9300	13.3%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5660	6360	11.7%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.61	0.65	0.04	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	5.22	6.60	23.4%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	14100	15500	9.60%	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: 1295715) - continued											
VA24A0289-001	BA2352-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	279	294	5.20%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11500	12300	6.96%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.050	0.051	0.001	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	194	178	8.36%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	417	269	43.0%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	10.1	10.7	5.87%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.96	4.27	7.57%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	42.6	44.5	4.45%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4560	3960	14.2%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.1	1.3	0.8	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: 1295717)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1295714)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1295715)						
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: 1295715) - 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: 1298410)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1298411)						
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: 1295716)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1295717)									
Moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
Metals (QCLot: 1295714)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	96.4	80.0	120	----
Metals (QCLot: 1295715)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.4	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	95.2	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.2	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	90.8	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.9	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	90.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.1	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	90.7	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.9	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	92.4	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	94.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	96.0	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.3	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.8	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	91.6	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	91.7	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.6	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	94.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	82.0	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	95.2	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.6	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.7	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: 1295715) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.8	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.5	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.3	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.2	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	92.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.5	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: 1298410)										
VA24A0289-001	BA2352-A-1	Mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	89.9	50.0	140	----
TCLP Metals (QCLot: 1298411)										
VA24A0289-001	BA2352-A-1	Antimony, TCLP	7440-36-0	E444	4.71 mg/L	5 mg/L	94.2	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.4	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.3 mg/L	12.5 mg/L	90.3	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.227 mg/L	0.25 mg/L	90.7	50.0	140	----
		Boron, TCLP	7440-42-8	E444	11.2 mg/L	10 mg/L	112	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.225 mg/L	0.25 mg/L	90.2	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	1.16 mg/L	1.25 mg/L	93.0	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.226 mg/L	0.25 mg/L	90.5	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.15 mg/L	2.5 mg/L	86.1	50.0	140	----
		Iron, TCLP	7439-89-6	E444	225 mg/L	250 mg/L	89.9	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.25 mg/L	10 mg/L	92.5	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	232 mg/L	250 mg/L	92.6	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.27 mg/L	2.5 mg/L	90.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.58 mg/L	5 mg/L	91.6	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.080 mg/L	0.1 mg/L	80.0	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.8	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.80 mg/L	5 mg/L	96.1	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.0	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.21 mg/L	10 mg/L	92.1	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	81.5	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1295714)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	106	70.0	130	----
Metals (QCLot: 1295715)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	97.4	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	98.9	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.2	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	97.1	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	88.9	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	92.3	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	96.9	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	90.2	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	98.5	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	100	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	97.2	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	99.7	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	98.3	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.8	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	85.5	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	100	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	93.4	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	104	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	90.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	113	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: 1295715) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	108	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	92.2	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	96.0	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

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

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

Service Requested (Rush for routine analysis subject to availability)

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

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

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

Lab Work Order # (lab use only)		ALS Contact:		Sampler:	

Analysis Request

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

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
	BA2352-A-1	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-2	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-3	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-4	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-5	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-6	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-7	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-8	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-9	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-10	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-11	27-Dec-23	9:00	Soil	X	X		X	1
	BA2352-A-12	27-Dec-23	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA24A0289

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
	4-Jan-24	0800				14.8 °C		Jan 8	9:25	

GENF 20.00 Front