metrovancouver

Bottom Ash Data

2024 Week 13

The following analytical report represents bottom ash composite results for week 13 of 2024 (March 24, 2024 to March 30, 2024).

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	: **VA24A7012**	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	: 03-Apr-2024 16:00
PO	: VANCO0000052919	Date Analysis Commenced	: 04-Apr-2024
C-O-C number	: ----	Issue Date	: 08-Apr-2024 15:57
Sampler	: ----		
Site	: ----		
Quote number	: Covanta Burnaby Standing Offer 2024		
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*
Ghazaleh Khanmirzaei	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sam Silveira	Analyst	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: BA2413-A-1	BA2413-A-2	BA2413-A-3	BA2413-A-4	BA2413-A-5
					Client sampling date / time: 27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
					VA24A7012-001	VA24A7012-002	VA24A7012-003	VA24A7012-004	VA24A7012-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	25.3	24.6	24.4	23.5	23.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	12.7	12.8	12.8	12.8	12.8
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	32400	36800	34800	36800	34400
Antimony	7440-36-0	E440/VA	0.10	mg/kg	103	95.2	66.7	70.6	89.6
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.5	22.5	19.9	18.6	26.4
Barium	7440-39-3	E440/VA	0.50	mg/kg	329	342	428	415	369
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.38	0.32	0.32	0.33	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.40	7.12	6.34	6.93	7.53
Boron	7440-42-8	E440/VA	5.0	mg/kg	214	173	230	186	210
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	7.70	9.41	8.77	6.78	8.36
Calcium	7440-70-2	E440/VA	50	mg/kg	131000	130000	124000	123000	124000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	123	114	181	125	113
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	337	75.6	32.7	77.0	49.2
Copper	7440-50-8	E440/VA	0.50	mg/kg	2230	3480	1800	1120	1930
Iron	7439-89-6	E440/VA	50	mg/kg	42800	54600	57300	51000	46700
Lead	7439-92-1	E440/VA	0.50	mg/kg	592	1390	898	286	352
Lithium	7439-93-2	E440/VA	2.0	mg/kg	40.0	25.6	32.5	30.7	23.9
Magnesium	7439-95-4	E440/VA	20	mg/kg	11400	11600	11200	10800	10700
Manganese	7439-96-5	E440/VA	1.0	mg/kg	744	739	862	695	855
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.0563	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	27.5	16.5	17.6	26.4	18.7
Nickel	7440-02-0	E440/VA	0.50	mg/kg	104	214	129	117	105
Phosphorus	7723-14-0	E440/VA	50	mg/kg	6840	6440	6600	7640	8000
Potassium	7440-09-7	E440/VA	100	mg/kg	5150	5130	5090	5620	5490
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.51	0.50	0.37	0.43	0.55
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.91	3.74	3.91	6.08	6.00
Sodium	7440-23-5	E440/VA	50	mg/kg	14700	14800	14900	16400	15300
Strontium	7440-24-6	E440/VA	0.50	mg/kg	272	282	249	313	274

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2413-A-1	BA2413-A-2	BA2413-A-3	BA2413-A-4	BA2413-A-5
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
						VA24A7012-001	VA24A7012-002	VA24A7012-003	VA24A7012-004	VA24A7012-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11300	11200	10600	11500	12200
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		99.5	119	375	92.7	92.1
Titanium	7440-32-6	E440/VA	1.0	mg/kg		204	215	219	212	206
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		10.2	8.59	7.00	7.92	9.91
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.60	2.38	2.28	2.41	2.65
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		35.2	35.7	39.5	36.4	35.7
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4270	6470	3220	3690	5560
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.0	2.8	3.9	2.9	2.1
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.2	12.1	12.1	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.85	9.18	9.07	8.88	8.87
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.24	7.06	7.23	7.42	7.81
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		1.96	1.99	1.97	2.13	1.84
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.060	0.065	0.055	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1770	1840	1900	1820	1680
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		0.477	1.37	0.642	0.622	0.348
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.489	0.631	0.506	0.545	0.454
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		117	115	112	103	97.8
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

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2413-A-1	BA2413-A-2	BA2413-A-3	BA2413-A-4	BA2413-A-5
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A7012-001	VA24A7012-002	VA24A7012-003	VA24A7012-004	VA24A7012-005
						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		2.72	6.46	2.90	1.34	<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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2413-A-6	BA2413-A-7	BA2413-A-8	BA2413-A-9	BA2413-A-10
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
						VA24A7012-006	VA24A7012-007	VA24A7012-008	VA24A7012-009	VA24A7012-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		24.4	24.0	22.7	24.2	23.5
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.8	12.8	12.7	12.7	12.8
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		34400	43400	36800	34900	30500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		80.6	92.3	104	100	126
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		20.8	25.3	22.9	21.1	24.8
Barium	7440-39-3	E440/VA	0.50	mg/kg		428	386	436	316	333
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.35	0.35	0.32	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		6.94	6.89	6.90	7.04	7.29
Boron	7440-42-8	E440/VA	5.0	mg/kg		240	177	238	166	215
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		7.26	36.2	7.87	7.95	9.53
Calcium	7440-70-2	E440/VA	50	mg/kg		127000	132000	134000	122000	127000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		128	140	140	122	136
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		43.8	35.4	37.7	57.8	30.1
Copper	7440-50-8	E440/VA	0.50	mg/kg		1760	2450	1530	5020	2860
Iron	7439-89-6	E440/VA	50	mg/kg		45800	46100	45100	71600	44800
Lead	7439-92-1	E440/VA	0.50	mg/kg		446	1120	519	413	1570
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.8	27.0	30.9	26.0	25.4
Magnesium	7439-95-4	E440/VA	20	mg/kg		11200	10700	11900	11600	12300
Manganese	7439-96-5	E440/VA	1.0	mg/kg		691	742	688	683	635
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	0.0511
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		25.8	22.2	23.0	13.8	20.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg		133	750	104	109	854
Phosphorus	7723-14-0	E440/VA	50	mg/kg		6500	7220	7810	7660	7600
Potassium	7440-09-7	E440/VA	100	mg/kg		5420	6000	5220	5330	5560
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.48	0.47	0.47	0.46	0.67
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.76	4.55	5.03	4.52	6.45
Sodium	7440-23-5	E440/VA	50	mg/kg		15100	16200	16000	15100	16200
Strontium	7440-24-6	E440/VA	0.50	mg/kg		269	274	317	258	270
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12300	12400	12800	12100	12500

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2413-A-6	BA2413-A-7	BA2413-A-8	BA2413-A-9	BA2413-A-10
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
						VA24A7012-006	VA24A7012-007	VA24A7012-008	VA24A7012-009	VA24A7012-010
						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		85.1	124	95.4	106	174
Titanium	7440-32-6	E440/VA	1.0	mg/kg		227	264	310	218	218
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		9.05	45.4	11.9	11.4	15.3
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.59	2.53	2.51	2.47	2.76
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		37.2	34.9	37.9	38.5	37.0
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4610	3110	2690	3990	5890
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.5	3.7	1.9	2.5	2.0
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.3	12.3	12.1	12.3	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.09	8.95	8.93	8.82	9.31
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units		8.14	7.87	8.09	7.74	8.15
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		1.77	1.83	1.80	1.96	1.73
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		1630	1670	1620	1710	1700
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		0.138	0.211	0.107	0.277	0.095
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.424	0.402	0.423	0.420	0.398
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		93.0	95.7	94.8	101	93.6
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
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 (Matrix: Soil/Solid)					Client sample ID	BA2413-A-6	BA2413-A-7	BA2413-A-8	BA2413-A-9	BA2413-A-10
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00	27-Mar-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A7012-006	VA24A7012-007	VA24A7012-008	VA24A7012-009	VA24A7012-010
						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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2413-A-11	BA2413-A-12	----	----	----
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	----	----	----
						VA24A7012-011	VA24A7012-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		24.2	24.2	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.8	12.7	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		38400	30100	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		79.1	87.7	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		22.0	23.8	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		425	378	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.37	0.39	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.13	6.99	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		222	240	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		7.69	7.90	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		128000	126000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		124	117	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		246	181	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		1820	1010	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		44400	40400	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		936	526	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		31.1	47.6	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		11600	11100	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		626	732	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0570	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		16.6	17.0	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		373	91.6	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7390	8130	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		5460	5890	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.50	0.49	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.32	5.35	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		16500	17300	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		290	361	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12400	11200	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2413-A-11	BA2413-A-12	----	----	----
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A7012-011	VA24A7012-012	--------	--------	--------
						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		81.0	92.7	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		185	168	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		8.72	11.3	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.55	2.67	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		41.9	36.5	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3140	5690	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.8	3.5	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.2	12.3	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.14	9.01	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.86	2.86	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		8.14	8.11	----	----	----
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		1.91	1.74	----	----	----
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		1780	1680	----	----	----
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		0.090	0.085	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.403	0.409	----	----	----
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		95.0	92.6	----	----	----
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 (Matrix: Soil/Solid)					Client sample ID	BA2413-A-11	BA2413-A-12	----	----	----
					Client sampling date / time	27-Mar-2024 09:00	27-Mar-2024 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A7012-011	VA24A7012-012	--------	--------	--------
						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	: **VA24A7012**	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	: 03-Apr-2024 16:00
PO	: VANCO0000052919	Issue Date	: 08-Apr-2024 15:57
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Covanta Burnaby Standing Offer 2024		
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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	Antimony	7440-36-0	E440	56.9 % 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.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-1391506 002	----	Silver	7440-22-4	E440	78.8 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group : 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*	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-1	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-10	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-11	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-12	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-2	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-3	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-4	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 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 BA2413-A-5	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-6	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-7	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-8	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2413-A-9	E510	27-Mar-2024	05-Apr-2024	28 days	9 days	✓	05-Apr-2024	28 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-1	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-10	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-11	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-12	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-2	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-3	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-4	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-5	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-6	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-7	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-8	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2413-A-9	E440	27-Mar-2024	05-Apr-2024	180 days	9 days	✓	06-Apr-2024	180 days	10 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-1	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 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 BA2413-A-10	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-11	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-12	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-2	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-3	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-4	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-5	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-6	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-7	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 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*	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-8	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2413-A-9	E144	27-Mar-2024	----	----	----		04-Apr-2024	----	8 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-1	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-10	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-11	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-12	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-2	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-3	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-4	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 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 BA2413-A-5	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-6	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-7	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-8	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2413-A-9	E108	27-Mar-2024	05-Apr-2024	30 days	9 days	✓	05-Apr-2024	30 days	9 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-1	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-10	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-11	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-12	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 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 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) BA2413-A-2	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-3	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-4	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-5	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-6	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-7	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-8	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2413-A-9	E512	05-Apr-2024	06-Apr-2024	37 days	10 days	✓	06-Apr-2024	37 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-1	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 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) BA2413-A-10	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-11	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-12	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-2	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-3	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-4	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-5	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-6	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-7	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 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) BA2413-A-8	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2413-A-9	E444	05-Apr-2024	06-Apr-2024	189 days	10 days	✓	07-Apr-2024	189 days	11 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-1	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-10	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-11	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-12	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-2	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-3	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-4	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 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) BA2413-A-5	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-6	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-7	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-8	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2413-A-9	EPP444	27-Mar-2024	05-Apr-2024	----	----		----	28 days	9 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	1391506	1	18	5.5	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1391507	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	1391509	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1391508	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1391506	2	18	11.1	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1391507	2	18	11.1	10.0	✓
Moisture Content by Gravimetry	E144	1391509	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1391508	1	18	5.5	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1393468	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1391506	1	18	5.5	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1393469	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1391507	1	18	5.5	5.0	✓
Moisture Content by Gravimetry	E144	1391509	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1393468	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1393469	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	: **VA24A7012**	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	: 03-Apr-2024 16:00
PO	: VANCO0000052919	Date Analysis Commenced	: 04-Apr-2024
C-O-C number	: ----	Issue Date	: 08-Apr-2024 15:58
Sampler	: ---- ----		
Site	: ----		
Quote number	: Covanta Burnaby Standing Offer 2024		
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*
Ghazaleh Khanmirzaei	Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1391508)											
VA24A7009-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	5.40	5.32	1.5%	5%	----
Physical Tests (QC Lot: 1391509)											
VA24A7012-001	BA2413-A-1	Moisture	----	E144	0.25	%	25.3	25.2	0.336%	20%	----
Metals (QC Lot: 1391506)											
VA24A7009-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0666	0.0647	0.0019	Diff <2x LOR	----
Metals (QC Lot: 1391507)											
VA24A7009-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	15400	15300	0.707%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	2.19	1.22	56.9%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	6.80	6.44	5.53%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	74.7	71.1	4.92%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.30	0.29	0.005	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	0.34	0.37	0.03	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.323	0.291	10.6%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	7770	7290	6.36%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	33.0	33.5	1.40%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	11.0	10.5	4.87%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	41.1	43.2	5.17%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	24500	23700	3.43%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	60.8	70.8	15.2%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	16.9	15.8	6.92%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	7600	7740	1.88%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	290	271	6.70%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.80	1.66	8.17%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	34.7	34.8	0.227%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	578	552	4.58%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1180	1150	2.65%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.31	0.11	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.10	0.13	0.02	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	431	445	3.23%	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: 1391507) - continued											
VA24A7009-001	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	42.9	43.0	0.343%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	3800	3100	700	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.084	0.081	0.003	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	6.6	4.1	2.5	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	935	760	20.7%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.21	1.26	4.30%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	49.9	49.0	1.86%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	114	102	11.4%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	3.9	3.9	0.03	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: 1391509)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1391506)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1391507)						
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: 1391507) - 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: 1393468)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1393469)						
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: 1391508)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.0	95.0	105	----
Physical Tests (QCLot: 1391509)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 1391506)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.2	80.0	120	----
Metals (QCLot: 1391507)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	86.6	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	89.8	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	93.3	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.8	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	88.4	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	89.0	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	85.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	89.3	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	88.6	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	87.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	86.2	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	83.7	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	84.9	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.0	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	87.4	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	84.9	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	86.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	88.2	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	91.1	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	# 78.8	80.0	120	MES
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	94.8	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	87.9	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	82.4	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: 1391507) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	87.2	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	90.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	87.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	88.6	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	90.6	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	87.9	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	85.7	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	88.8	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

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: 1393468)										
VA24A7012-001	BA2413-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	103	50.0	140	----
TCLP Metals (QCLot: 1393469)										
VA24A7012-001	BA2413-A-1	Antimony, TCLP	7440-36-0	E444	4.64 mg/L	5 mg/L	92.9	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.4 mg/L	12.5 mg/L	108	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.222 mg/L	0.25 mg/L	89.0	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.09 mg/L	10 mg/L	90.9	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.218 mg/L	0.25 mg/L	87.2	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	1.26 mg/L	1.25 mg/L	100	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	2.37 mg/L	2.5 mg/L	94.7	50.0	140	----
		Iron, TCLP	7439-89-6	E444	237 mg/L	250 mg/L	94.7	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.08 mg/L	10 mg/L	90.8	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	246 mg/L	250 mg/L	98.6	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.48 mg/L	2.5 mg/L	99.3	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.86 mg/L	5 mg/L	97.1	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.077 mg/L	0.1 mg/L	76.9	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	4.87 mg/L	5 mg/L	97.4	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	9.57 mg/L	10 mg/L	95.7	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	84.4	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: 1391506)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 1391507)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	98.8	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	94.4	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	98.3	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	97.7	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	100.0	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	116	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	90.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	93.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	93.5	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	87.2	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	100	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	91.6	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	98.0	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	89.9	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	93.6	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	85.2	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	111	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	94.6	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	94.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	87.6	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	104	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Qualifier
Metals (QCLot: 1391507) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	98.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	98.4	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	89.5	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.1	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

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COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	ofetherstonhaugh@covanta.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Request
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org			
					Sarah.Wellman@metrovancouver.org			
Invoice To	Same as Report ?			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:				
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
Lab Work Order # (lab use only)	A7012			ALS Contact:		Sampler:		

Sample #	Sample Identification (This description will appear on the ...)	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
	BA2413-A-1	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-2	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-3	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-4	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-5	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-6	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-7	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-8	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-9	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-10	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-11	27-Mar-24	9:00	Soil	X	X				X						1
	BA2413-A-12	27-Mar-24	9:00	Soil	X	X				X						1

Environmental Division
Vancouver
Work Order Reference
VA24A7012

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
	3-Apr-24	0826				16 °C	RJ	Apr 3	16:10	