Bottom Ash Data

2024 Week 10

The following analytical report represents bottom ash composite results for week 10 of 2024 (March 3, 2024 to March 9, 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	: **VA24A5105**	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	: 12-Mar-2024 12:45
PO	: VANCO0000052919	Date Analysis Commenced	: 13-Mar-2024
C-O-C number	: ----	Issue Date	: 20-Mar-2024 10:51
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
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Nik Perkio	Inorganics Analyst	Metals, Waterloo, Ontario
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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.

Qualifiers

Qualifier	*Description*
DLHM	*Detection Limit Adjusted: Sample has high moisture content.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2410-A-1	BA2410-A-2	BA2410-A-3	BA2410-A-4	BA2410-A-5
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
						VA24A5105-001	VA24A5105-002	VA24A5105-003	VA24A5105-004	VA24A5105-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.8	21.8	21.2	21.1	21.0
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.3	12.3	12.3	12.3
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		28800	28400	27400	37800	47400
Antimony	7440-36-0	E440/VA	0.10	mg/kg		170	161	179	147	161
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		48.2	44.6	47.1	30.2	35.8
Barium	7440-39-3	E440/VA	0.50	mg/kg		391	364	346	450	412
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.37	0.35	0.42	0.38	0.33
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		12.0	10.5	12.4	8.05	10.3
Boron	7440-42-8	E440/VA	5.0	mg/kg		210	194	222	202	198
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		14.3	14.4	14.1	11.3	13.0
Calcium	7440-70-2	E440/VA	50	mg/kg		180000	173000	177000	155000	163000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		159	184	228	236	162
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		84.4	52.9	108	37.4	110
Copper	7440-50-8	E440/VA	0.50	mg/kg		1890	2580	2270	1570	2490
Iron	7439-89-6	E440/VA	50	mg/kg		33000	39400	39800	44600	43200
Lead	7439-92-1	E440/VA	0.50	mg/kg		340	407	368	264	328
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.1	26.8	32.3	26.1	32.0
Magnesium	7439-95-4	E440/VA	20	mg/kg		12500	11200	11400	11600	11400
Manganese	7439-96-5	E440/VA	1.0	mg/kg		780	859	760	866	768
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.106	0.0536	0.0606	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		74.8	76.3	72.4	46.9	57.0
Nickel	7440-02-0	E440/VA	0.50	mg/kg		160	159	188	200	149
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8910	7940	9390	7600	8160
Potassium	7440-09-7	E440/VA	100	mg/kg		6370	5880	6980	6890	6640
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.49	0.59	0.54	0.44	0.54
Silver	7440-22-4	E440/VA	0.10	mg/kg		6.06	5.23	6.69	6.63	8.42
Sodium	7440-23-5	E440/VA	50	mg/kg		16700	15300	16800	18000	17000
Strontium	7440-24-6	E440/VA	0.50	mg/kg		332	312	373	324	340

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2410-A-1	BA2410-A-2	BA2410-A-3	BA2410-A-4	BA2410-A-5
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
						VA24A5105-001	VA24A5105-002	VA24A5105-003	VA24A5105-004	VA24A5105-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		13100	12600	13600	12300	12800
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		146	138	363	122	198
Titanium	7440-32-6	E440/VA	1.0	mg/kg		210	221	251	354	407
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		5.18	7.01	6.92	5.60	5.29
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.15	2.90	3.16	2.89	3.05
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		39.5	34.7	37.3	35.8	39.9
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4400	4190	4850	3310	4090
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.9	1.8	1.6	2.4	3.3
Speciated Metals										
Chromium, hexavalent [Cr VI]	18540-29-9	E532/WT	0.10	mg/kg		1.82 DLHM	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.2	12.2	12.2	12.2	12.2
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.19	9.46	9.04	9.35	9.00
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.91	8.10	7.98	7.66	7.45
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.13	2.05	1.93	2.20	2.36
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	0.084
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2390	2390	2290	2410	2540
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		0.166	0.111	0.214	0.255	0.452
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.712	0.814	0.698	0.696	0.696
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		122	120	118	126	136
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2410-A-1	BA2410-A-2	BA2410-A-3	BA2410-A-4	BA2410-A-5
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
						VA24A5105-001	VA24A5105-002	VA24A5105-003	VA24A5105-004	VA24A5105-005
						Result	Result	Result	Result	Result
TCLP Metals										
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	0.27
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
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	0.79	1.88
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	BA2410-A-6	BA2410-A-7	BA2410-A-8	BA2410-A-9	BA2410-A-10
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
						VA24A5105-006	VA24A5105-007	VA24A5105-008	VA24A5105-009	VA24A5105-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		21.2	22.0	22.4	21.1	21.6
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.3	12.3	12.3	12.3
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		31400	29900	35300	37500	27100
Antimony	7440-36-0	E440/VA	0.10	mg/kg		132	146	148	166	200
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		27.5	41.2	36.4	38.2	45.6
Barium	7440-39-3	E440/VA	0.50	mg/kg		334	343	444	389	361
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.35	0.35	0.64	0.33	0.37
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		7.10	16.0	8.07	15.9	13.0
Boron	7440-42-8	E440/VA	5.0	mg/kg		225	161	210	190	200
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		9.10	11.8	10.5	11.9	20.2
Calcium	7440-70-2	E440/VA	50	mg/kg		148000	149000	152000	161000	179000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		188	198	155	223	183
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		268	353	137	75.0	59.9
Copper	7440-50-8	E440/VA	0.50	mg/kg		1820	1790	7700	1460	1990
Iron	7439-89-6	E440/VA	50	mg/kg		49200	42900	59200	43100	40500
Lead	7439-92-1	E440/VA	0.50	mg/kg		217	312	264	1490	364
Lithium	7439-93-2	E440/VA	2.0	mg/kg		26.3	52.8	23.6	30.5	25.9
Magnesium	7439-95-4	E440/VA	20	mg/kg		10100	11300	10900	11400	12600
Manganese	7439-96-5	E440/VA	1.0	mg/kg		670	1010	728	895	689
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0548	<0.0500	<0.0500	0.0554
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		65.0	59.8	50.2	45.8	58.7
Nickel	7440-02-0	E440/VA	0.50	mg/kg		228	230	707	257	157
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7500	7470	7160	8780	9200
Potassium	7440-09-7	E440/VA	100	mg/kg		7130	6810	5410	6480	6400
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.41	0.44	0.51	0.48	0.59
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.71	4.28	9.68	4.96	11.4
Sodium	7440-23-5	E440/VA	50	mg/kg		19000	17300	15700	16600	16600
Strontium	7440-24-6	E440/VA	0.50	mg/kg		315	285	357	301	348
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10900	12000	12200	13100	14900

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2410-A-6	BA2410-A-7	BA2410-A-8	BA2410-A-9	BA2410-A-10
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
						VA24A5105-006	VA24A5105-007	VA24A5105-008	VA24A5105-009	VA24A5105-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	0.053	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		108	116	121	134	150
Titanium	7440-32-6	E440/VA	1.0	mg/kg		344	264	372	366	259
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		8.56	4.20	6.39	5.89	7.65
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.70	2.79	2.62	2.99	3.69
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		34.5	36.0	40.1	41.4	40.0
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3190	4720	7440	4340	5000
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.3	2.4	2.3	1.6	<2.0 DLM
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.3	12.2	12.2	12.2
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.01	9.53	9.85	8.88	9.02
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.94	7.81	8.03	7.89	7.49
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		2.28	2.26	2.16	2.07	2.37
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	0.083
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2360	2610	2400	2240	2500
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	0.244	0.273	0.206	0.461
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.679	0.769	0.606	0.724	0.792
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		118	132	101	116	134
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	0.26
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	BA2410-A-6	BA2410-A-7	BA2410-A-8	BA2410-A-9	BA2410-A-10
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00	06-Mar-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A5105-006	VA24A5105-007	VA24A5105-008	VA24A5105-009	VA24A5105-010
						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	1.26
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	BA2410-A-11	BA2410-A-12	----	----	----
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	----	----	----
						VA24A5105-011	VA24A5105-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		20.1	21.0	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.3	12.3	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		45200	26800	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		107	167	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		34.1	45.1	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		394	327	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.32	0.34	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		9.19	10.2	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		214	173	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		8.10	13.2	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		158000	172000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		153	278	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		30.3	61.0	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		3010	1480	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		37000	34300	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		402	695	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.1	25.2	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		10200	11800	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		697	827	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		40.3	71.2	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		99.9	194	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7890	8670	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		6070	6280	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.42	0.53	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		10.5	5.90	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		15700	16500	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		219	333	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12500	12800	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2410-A-11	BA2410-A-12	----	----	----
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A5105-011	VA24A5105-012	--------	--------	--------
						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		180	143	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		401	192	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		5.16	5.99	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.72	3.08	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		36.1	35.7	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3850	4210	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.6	2.5	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.2	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.23	9.14	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.93	2.93	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.33	7.35	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.26	2.24	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.077	0.079	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2450	2500	----	----	----
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		0.593	0.480	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.711	0.842	----	----	----
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		131	129	----	----	----
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		0.28	0.34	----	----	----
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	BA2410-A-11	BA2410-A-12	----	----	----
					Client sampling date / time	06-Mar-2024 09:00	06-Mar-2024 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A5105-011	VA24A5105-012	--------	--------	--------
						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		2.90	3.17	----	----	----
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	: **VA24A5105**	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	: 12-Mar-2024 12:45
PO	: VANCO0000052919	Issue Date	: 20-Mar-2024 10:51
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 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

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

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	Cadmium	7440-43-9	E440	49.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Speciated Metals	VA24A5105-001	BA2410-A-1	Chromium, hexavalent [Cr VI]	18540-29-9	E532	122 % DUP-H	35%	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 BA2410-A-1	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-10	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-11	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-12	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-2	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-3	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-4	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-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 BA2410-A-5	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-6	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-7	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-8	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2410-A-9	E510	06-Mar-2024	14-Mar-2024	28 days	8 days	✓	15-Mar-2024	28 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-1	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-10	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-11	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-12	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 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*	
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-2	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-3	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-4	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-5	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-6	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-7	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-8	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2410-A-9	E440	06-Mar-2024	14-Mar-2024	180 days	8 days	✓	15-Mar-2024	180 days	9 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-1	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 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 BA2410-A-10	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-11	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-12	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-2	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-3	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-4	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-5	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-6	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-7	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 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 BA2410-A-8	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2410-A-9	E144	06-Mar-2024	----	----	----		13-Mar-2024	----	7 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-1	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-10	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-11	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-12	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-2	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-3	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-4	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-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 BA2410-A-5	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-6	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-7	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-8	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2410-A-9	E108	06-Mar-2024	14-Mar-2024	30 days	8 days	✓	15-Mar-2024	30 days	9 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap BA2410-A-1	E532	06-Mar-2024	18-Mar-2024	30 days	12 days	✓	18-Mar-2024	7 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-1	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-10	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-11	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 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
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-12	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-2	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-3	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-4	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-5	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-6	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-7	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-8	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2410-A-9	E512	19-Mar-2024	19-Mar-2024	41 days	13 days	✓	19-Mar-2024	41 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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-1	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-10	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-11	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-12	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-2	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-3	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-4	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-5	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2410-A-6	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2410-A-7	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2410-A-8	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA2410-A-9	E444	19-Mar-2024	19-Mar-2024	193 days	13 days	✓	19-Mar-2024	193 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-1	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-10	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-11	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-12	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-2	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-3	EPP444	06-Mar-2024	19-Mar-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
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-4	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-5	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-6	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-7	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-8	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2410-A-9	EPP444	06-Mar-2024	19-Mar-2024	----	----		----	28 days	13 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)							
Hexavalent Chromium (Cr VI) by IC	E532	1370840	1	10	10.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1364628	1	16	6.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1364629	1	16	6.2	5.0	✓
Moisture Content by Gravimetry	E144	1364631	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1364630	1	16	6.2	5.0	✓
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	1370840	4	10	40.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	1364628	1	16	6.2	10.0	×
Metals in Soil/Solid by CRC ICPMS	E440	1364629	1	16	6.2	10.0	×
Moisture Content by Gravimetry	E144	1364631	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1364630	1	16	6.2	5.0	✓
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	1370840	2	10	20.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	1371800	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1364628	1	16	6.2	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1371801	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1364629	1	16	6.2	5.0	✓
Moisture Content by Gravimetry	E144	1364631	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1371800	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1371801	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.
Hexavalent Chromium (Cr VI) by IC	E532 ALS Environmental - Waterloo	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

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.
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.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 ALS Environmental - Waterloo	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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	: **VA24A5105**	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	: 12-Mar-2024 12:45
PO	: VANCO0000052919	Date Analysis Commenced	: 13-Mar-2024
C-O-C number	: ----	Issue Date	: 20-Mar-2024 10:52
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
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Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
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Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: 1364630)											
VA24A3084-003	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.54	7.53	0.1%	5%	----
Physical Tests (QC Lot: 1364631)											
VA24A5105-001	BA2410-A-1	Moisture	----	E144	0.25	%	21.8	21.0	3.76%	20%	----
Metals (QC Lot: 1364628)											
VA24A3084-003	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.119	0.101	0.0187	Diff <2x LOR	----
Metals (QC Lot: 1364629)											
VA24A3084-003	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	33000	28200	15.5%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	1.91	1.99	4.44%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	12.3	11.1	10.0%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	157	215	31.4%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.47	0.45	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	7.8	7.5	0.3	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.228	0.137	49.9%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	13800	13900	0.450%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	58.2	50.8	13.5%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	19.4	18.2	6.60%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	104	96.8	7.65%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	44100	42400	3.93%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	29.8	29.1	2.39%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	15.0	14.0	7.41%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	10400	10400	0.0533%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1020	937	8.86%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.72	0.66	7.93%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	39.5	37.0	6.76%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	670	672	0.297%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	870	760	13.4%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	367	385	4.70%	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: 1364629) - continued											
VA24A3084-003	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	55.6	50.3	9.93%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	4.8	6.1	1.3	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2300	2210	4.06%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.749	0.652	13.8%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	132	126	4.68%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	143	131	9.03%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	7.4	7.0	5.42%	30%	----
Speciated Metals (QC Lot: 1370012)											
VA24A5105-001	BA2410-A-1	Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.12	mg/kg	1.82	7.52	122%	35%	DUP-H

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: 1364631)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1364628)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1364629)						
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: 1364629) - 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	----
Speciated Metals (QCLot: 1370012)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
Speciated Metals (QCLot: 1370840)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 1371800)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1371801)						
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: 1364630)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1364631)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1364628)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	94.0	80.0	120	----
Metals (QCLot: 1364629)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	95.1	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	97.9	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	93.9	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.6	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.2	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	94.6	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.0	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	91.2	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	93.6	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.0	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	97.4	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.6	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	90.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	95.4	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.9	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	96.4	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: 1364629) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	94.3	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	94.9	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	92.4	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	90.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	95.6	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.0	80.0	120	----
Speciated Metals (QCLot: 1370012)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	101	80.0	120	----
Speciated Metals (QCLot: 1370840)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	97.1	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: 1371800)										
VA24A5105-001	BA2410-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----
TCLP Metals (QCLot: 1371801)										
VA24A5105-001	BA2410-A-1	Antimony, TCLP	7440-36-0	E444	4.51 mg/L	5 mg/L	90.2	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.3	50.0	140	----
		Barium, TCLP	7440-39-3	E444	11.7 mg/L	12.5 mg/L	93.8	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.225 mg/L	0.25 mg/L	89.9	50.0	140	----
		Boron, TCLP	7440-42-8	E444	9.07 mg/L	10 mg/L	90.7	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.227 mg/L	0.25 mg/L	90.7	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	1.12 mg/L	1.25 mg/L	89.6	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	0.220 mg/L	0.25 mg/L	88.0	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.06 mg/L	2.5 mg/L	82.4	50.0	140	----
		Iron, TCLP	7439-89-6	E444	223 mg/L	250 mg/L	89.3	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.66 mg/L	10 mg/L	86.6	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	232 mg/L	250 mg/L	92.9	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.16 mg/L	2.5 mg/L	86.2	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.70 mg/L	5 mg/L	94.0	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.080 mg/L	0.1 mg/L	79.9	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	87.4	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.56 mg/L	5 mg/L	91.2	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.69 mg/L	0.75 mg/L	91.6	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	8.86 mg/L	10 mg/L	88.6	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	77.8	50.0	150	----

Reference Material (RM) Report

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

Sub-Matrix:

Reference Material (RM) Report									
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Speciated Metals (QCLot: 1370012)									
	RM	Chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	90.9	70.0	130	----
Speciated Metals (QCLot: 1370840)									
	RM	Chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	94.8	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

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

Sample #	Sample Identification (This 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
	BA2410-A-1	06-Mar-24	9:00	Soil	X	X		X		X							1
	BA2410-A-2	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-3	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-4	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-5	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-6	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-7	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-8	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-9	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-10	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-11	06-Mar-24	9:00	Soil	X	X				X							1
	BA2410-A-12	06-Mar-24	9:00	Soil	X	X				X							1

Environmental Division
Vancouver
Work Order Reference
VA24A5105

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
[signature]	12-Mar-24	0900	RK	3/12	12:45 pm	20 °C				