metrovancouver

Bottom Ash Data

2024 Week 12

The following analytical report represents bottom ash composite results for week 12 of 2024 (March 17, 2024 to March 23, 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	: **VA24A6320**	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	: 26-Mar-2024 13:30
PO	: VANCO0000052919	Date Analysis Commenced	: 28-Mar-2024
C-O-C number	: ----	Issue Date	: 02-Apr-2024 14:58
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 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
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia

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	BA2412-A-1	BA2412-A-2	BA2412-A-3	BA2412-A-4	BA2412-A-5
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
						VA24A6320-001	VA24A6320-002	VA24A6320-003	VA24A6320-004	VA24A6320-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		23.0	22.6	22.0	22.2	20.0
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.6	12.6	12.6	12.6	12.6
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		31800	31600	39000	31000	35200
Antimony	7440-36-0	E440/VA	0.10	mg/kg		122	168	149	148	133
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		30.6	35.5	35.0	33.6	34.4
Barium	7440-39-3	E440/VA	0.50	mg/kg		335	380	345	345	382
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.36	0.40	0.39	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.73	10.3	17.9	9.58	11.1
Boron	7440-42-8	E440/VA	5.0	mg/kg		244	249	291	297	250
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		10.3	10.9	60.8	10.6	9.77
Calcium	7440-70-2	E440/VA	50	mg/kg		143000	165000	169000	159000	154000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		176	154	157	201	149
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		44.1	301	51.8	112	133
Copper	7440-50-8	E440/VA	0.50	mg/kg		1620	3530	3560	2400	11200
Iron	7439-89-6	E440/VA	50	mg/kg		42300	56600	43300	70800	58000
Lead	7439-92-1	E440/VA	0.50	mg/kg		377	340	826	345	7480
Lithium	7439-93-2	E440/VA	2.0	mg/kg		24.1	41.4	26.2	23.2	43.6
Magnesium	7439-95-4	E440/VA	20	mg/kg		11900	13300	12400	11200	11600
Manganese	7439-96-5	E440/VA	1.0	mg/kg		788	800	918	1260	1130
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	0.0718	0.0502	0.0502	0.0512
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		25.3	25.3	28.0	24.6	18.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg		129	345	134	276	704
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8340	8060	8260	6620	6520
Potassium	7440-09-7	E440/VA	100	mg/kg		5640	6120	6300	5510	6110
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.35	0.48	0.43	0.44	0.35
Silver	7440-22-4	E440/VA	0.10	mg/kg		6.97	5.51	5.68	5.80	5.54
Sodium	7440-23-5	E440/VA	50	mg/kg		15400	16700	17300	15100	16400
Strontium	7440-24-6	E440/VA	0.50	mg/kg		279	322	364	373	487

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2412-A-1	BA2412-A-2	BA2412-A-3	BA2412-A-4	BA2412-A-5
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
						VA24A6320-001	VA24A6320-002	VA24A6320-003	VA24A6320-004	VA24A6320-005
						Result	Result	Result	Result	Result
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12400	13800	12800	12100	12100
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	0.067	0.054	0.088
Tin	7440-31-5	E440/VA	2.0	mg/kg		103	120	134	106	134
Titanium	7440-32-6	E440/VA	1.0	mg/kg		144	286	198	233	224
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		16.7	14.4	15.8	13.7	9.99
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.85	3.07	3.44	3.17	3.07
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		41.9	45.8	52.5	44.7	40.3
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4620	4430	12800	3440	4940
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.1	1.4	2.7	2.2	2.7
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	12.1	12.1	12.1	11.7
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.27	8.76	9.03	8.65	8.60
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.10	7.29	7.18	7.20	6.98
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		2.38	2.41	2.46	2.39	2.32
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.093	0.106	0.084	0.081	0.095
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2020	2000	2070	2070	1990
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		0.468	0.932	0.609	1.06	5.72
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.653	0.541	0.686	0.598	0.614
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		116	119	116	117	119
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		0.26	0.36	0.25	<0.25	0.39
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	BA2412-A-1	BA2412-A-2	BA2412-A-3	BA2412-A-4	BA2412-A-5
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A6320-001	VA24A6320-002	VA24A6320-003	VA24A6320-004	VA24A6320-005
						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		6.54	5.94	4.66	5.09	9.95
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	BA2412-A-6	BA2412-A-7	BA2412-A-8	BA2412-A-9	BA2412-A-10
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
						VA24A6320-006	VA24A6320-007	VA24A6320-008	VA24A6320-009	VA24A6320-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		20.9	22.6	21.8	19.4	22.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.6	12.6	12.7	12.4	12.6
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		27500	34700	28600	33300	32700
Antimony	7440-36-0	E440/VA	0.10	mg/kg		138	148	136	129	129
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		38.3	33.0	33.1	36.0	28.9
Barium	7440-39-3	E440/VA	0.50	mg/kg		335	324	316	371	374
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.37	0.36	0.31	0.36	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		10.2	10.1	8.58	8.87	9.50
Boron	7440-42-8	E440/VA	5.0	mg/kg		190	234	182	190	210
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		11.2	12.5	11.0	10.9	11.0
Calcium	7440-70-2	E440/VA	50	mg/kg		156000	164000	154000	162000	151000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		136	159	150	141	146
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		355	1330	149	67.6	71.7
Copper	7440-50-8	E440/VA	0.50	mg/kg		1710	1760	3520	4430	4200
Iron	7439-89-6	E440/VA	50	mg/kg		43500	38900	53600	43900	46300
Lead	7439-92-1	E440/VA	0.50	mg/kg		568	412	9020	380	663
Lithium	7439-93-2	E440/VA	2.0	mg/kg		34.9	41.0	30.4	27.1	22.4
Magnesium	7439-95-4	E440/VA	20	mg/kg		11900	12300	10500	11700	11600
Manganese	7439-96-5	E440/VA	1.0	mg/kg		780	782	833	763	883
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0520	0.0646	0.0500	<0.0500	0.0560
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		21.7	25.4	18.2	21.7	20.9
Nickel	7440-02-0	E440/VA	0.50	mg/kg		153	114	158	273	240
Phosphorus	7723-14-0	E440/VA	50	mg/kg		6760	7680	8620	7570	6700
Potassium	7440-09-7	E440/VA	100	mg/kg		5970	6080	4990	5830	5840
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.50	0.47	0.42	0.40	0.46
Silver	7440-22-4	E440/VA	0.10	mg/kg		7.62	6.54	4.89	7.69	6.44
Sodium	7440-23-5	E440/VA	50	mg/kg		16400	16200	13200	15800	16800
Strontium	7440-24-6	E440/VA	0.50	mg/kg		320	352	290	304	292
Sulfur	7704-34-9	E440/VA	1000	mg/kg		12600	13400	12300	13300	12500

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA2412-A-6	BA2412-A-7	BA2412-A-8	BA2412-A-9	BA2412-A-10
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
						VA24A6320-006	VA24A6320-007	VA24A6320-008	VA24A6320-009	VA24A6320-010
						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		142	130	178	127	197
Titanium	7440-32-6	E440/VA	1.0	mg/kg		141	202	142	196	228
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		13.0	22.0	13.0	17.0	17.7
Uranium	7440-61-1	E440/VA	0.050	mg/kg		3.66	3.33	2.73	3.16	3.00
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		42.4	46.1	41.3	46.0	45.5
Zinc	7440-66-6	E440/VA	2.0	mg/kg		4390	3970	3790	5960	4690
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.5	2.5	2.3	1.8	1.7
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	12.1	11.6	12.1	12.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		8.86	9.01	8.69	9.26	8.71
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.96	6.87	7.31	7.83	9.16
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		2.40	2.34	2.30	2.25	1.91
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.118	0.104	0.073	<0.050	<0.050
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2050	2020	1970	2030	1830
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		0.779	0.634	0.506	0.432	<0.050
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.736	0.670	0.576	0.519	0.566
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		119	120	112	105	86.9
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		0.29	0.29	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	BA2412-A-6	BA2412-A-7	BA2412-A-8	BA2412-A-9	BA2412-A-10
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00	20-Mar-2024 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A6320-006	VA24A6320-007	VA24A6320-008	VA24A6320-009	VA24A6320-010
						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		8.72	13.7	2.87	<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	BA2412-A-11	BA2412-A-12	----	----	----
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	----	----	----
						VA24A6320-011	VA24A6320-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		20.7	21.2	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		12.6	12.6	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		30200	37000	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		151	306	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		27.1	31.6	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		334	325	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.32	0.41	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		8.71	8.79	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		177	265	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		9.96	11.2	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		144000	153000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		137	134	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		325	95.0	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		1470	1900	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		55300	45300	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		369	424	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		30.0	34.8	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		10700	12100	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		967	773	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		0.0539	0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		24.0	21.7	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		353	135	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		6300	7800	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		5760	5310	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.28	0.38	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.88	4.60	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		15400	14200	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		285	308	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11900	11800	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2412-A-11	BA2412-A-12	----	----	----
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24A6320-011	VA24A6320-012	--------	--------	--------
						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		104	2560	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		214	269	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		16.5	10.5	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.98	2.76	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		43.4	43.6	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		6620	4010	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		1.7	2.9	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		12.1	12.1	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		9.02	8.67	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.87	2.87	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		7.45	7.56	----	----	----
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		2.24	2.41	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.053	<0.050	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		1940	1920	----	----	----
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		0.445	0.271	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.494	0.537	----	----	----
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		110	110	----	----	----
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	BA2412-A-11	BA2412-A-12	----	----	----
					Client sampling date / time	20-Mar-2024 09:00	20-Mar-2024 09:00	----	----	----
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*		VA24A6320-011	VA24A6320-012	--------	--------	--------
						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		1.60	1.12	----	----	----
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	: **VA24A6320**	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	: 26-Mar-2024 13:30
PO	: VANCO0000052919	Issue Date	: 02-Apr-2024 14:58
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

- 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	VA24A6320-001	BA2412-A-1	Bismuth	7440-69-9	E440	44.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Cobalt	7440-48-4	E440	176 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Copper	7440-50-8	E440	136 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Iron	7439-89-6	E440	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Lithium	7439-93-2	E440	40.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Nickel	7440-02-0	E440	33.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA24A6320-001	BA2412-A-1	Tungsten	7440-33-7	E440	34.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-1	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-10	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-11	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-12	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-2	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-3	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-4	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-5	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-6	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-7	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-8	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2412-A-9	E510	20-Mar-2024	01-Apr-2024	28 days	13 days	✓	02-Apr-2024	28 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-1	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-10	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-11	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-12	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓

Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-2	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-3	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-4	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-5	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-6	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-7	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-8	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2412-A-9	E440	20-Mar-2024	01-Apr-2024	180 days	13 days	✓	02-Apr-2024	180 days	13 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-1	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	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 : Moisture Content by Gravimetry										
LDPE bag BA2412-A-10	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-11	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-12	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-2	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-3	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-4	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-5	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-6	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-7	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	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 : Moisture Content by Gravimetry										
LDPE bag BA2412-A-8	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2412-A-9	E144	20-Mar-2024	----	----	----		28-Mar-2024	----	9 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-1	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-10	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-11	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-12	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-2	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-3	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-4	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 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
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-5	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-6	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-7	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-8	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2412-A-9	E108	20-Mar-2024	01-Apr-2024	30 days	13 days	✓	02-Apr-2024	30 days	13 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-1	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-10	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-11	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-12	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 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) BA2412-A-2	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-3	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-4	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-5	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-6	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-7	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-8	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2412-A-9	E512	28-Mar-2024	30-Mar-2024	36 days	10 days	✓	30-Mar-2024	36 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-1	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-10	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-11	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-12	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-2	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-3	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-4	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-5	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-6	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-7	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-8	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2412-A-9	E444	28-Mar-2024	29-Mar-2024	188 days	9 days	✓	30-Mar-2024	188 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-1	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-10	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-11	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-12	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-2	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-3	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-4	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	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*	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-5	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-6	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-7	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-8	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2412-A-9	EPP444	20-Mar-2024	28-Mar-2024	----	----		----	28 days	8 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	1384699	1	16	6.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1384700	1	16	6.2	5.0	✓
Moisture Content by Gravimetry	E144	1384704	1	16	6.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1384701	1	16	6.2	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1384699	2	16	12.5	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1384700	2	16	12.5	10.0	✓
Moisture Content by Gravimetry	E144	1384704	1	16	6.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1384701	1	16	6.2	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1384722	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1384699	1	16	6.2	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1384723	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1384700	1	16	6.2	5.0	✓
Moisture Content by Gravimetry	E144	1384704	1	16	6.2	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1384722	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1384723	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	: **VA24A6320**	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	: 26-Mar-2024 13:30
PO	: VANCO0000052919	Date Analysis Commenced	: 28-Mar-2024
C-O-C number	: ----	Issue Date	: 02-Apr-2024 14:58
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
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia

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: 1384701)											
VA24A6320-001	BA2412-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	12.6	12.6	0.1%	5%	----
Physical Tests (QC Lot: 1384704)											
VA24A6320-001	BA2412-A-1	Moisture	----	E144	0.25	%	23.0	22.0	4.52%	20%	----
Metals (QC Lot: 1384699)											
VA24A6320-001	BA2412-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0504	0.0004	Diff <2x LOR	----
Metals (QC Lot: 1384700)											
VA24A6320-001	BA2412-A-1	Aluminum	7429-90-5	E440	50	mg/kg	31800	31500	1.06%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	122	152	21.6%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	30.6	35.1	13.8%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	335	326	2.80%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.33	0.005	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	8.73	13.7	44.2%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	244	282	14.4%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	10.3	12.4	18.7%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	143000	162000	12.2%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	176	142	21.3%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	44.1	689	176%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1620	8470	136%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	42300	60700	35.7%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	377	434	14.2%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	24.1	36.5	40.8%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	11900	11800	0.369%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	788	910	14.3%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	25.3	23.4	8.10%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	129	182	33.7%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	8340	7980	4.41%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5640	5730	1.56%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.44	0.09	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	6.97	5.96	15.6%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	15400	15300	1.16%	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: 1384700) - continued											
VA24A6320-001	BA2412-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	279	309	10.1%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12400	12900	4.16%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	103	155	40.0%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	144	180	22.5%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	16.7	11.8	34.8%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	2.85	3.44	18.7%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	41.9	43.2	3.08%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4620	4090	12.1%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.1	2.6	0.5	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: 1384704)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1384699)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1384700)						
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: 1384700) - 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: 1384722)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1384723)						
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: 1384701)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
Physical Tests (QCLot: 1384704)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1384699)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	106	80.0	120	----
Metals (QCLot: 1384700)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	110	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	114	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	110	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	111	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	108	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	107	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	106	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	109	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	109	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.6	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	110	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	113	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	109	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	111	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	111	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	117	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	99.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	105	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	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: 1384700) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	110	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	106	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	107	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	117	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	112	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	111	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: 1384722)										
VA24A6320-001	BA2412-A-1	Mercury, TCLP	7439-97-6	E512	0.0008 mg/L	0.001 mg/L	83.1	50.0	140	----
TCLP Metals (QCLot: 1384723)										
VA24A6320-001	BA2412-A-1	Antimony, TCLP	7440-36-0	E444	3.92 mg/L	5 mg/L	78.4	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.2 mg/L	5 mg/L	84.1	50.0	140	----
		Barium, TCLP	7440-39-3	E444	10.5 mg/L	12.5 mg/L	84.3	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.192 mg/L	0.25 mg/L	76.6	50.0	140	----
		Boron, TCLP	7440-42-8	E444	6.94 mg/L	10 mg/L	69.4	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.208 mg/L	0.25 mg/L	83.2	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	1.02 mg/L	1.25 mg/L	81.7	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	1.91 mg/L	2.5 mg/L	76.4	50.0	140	----
		Iron, TCLP	7439-89-6	E444	200 mg/L	250 mg/L	80.1	50.0	140	----
		Lead, TCLP	7439-92-1	E444	7.58 mg/L	10 mg/L	75.8	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	213 mg/L	250 mg/L	85.1	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	1.97 mg/L	2.5 mg/L	78.8	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.17 mg/L	5 mg/L	83.5	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.068 mg/L	0.1 mg/L	67.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	3.8 mg/L	5 mg/L	75.5	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	3.95 mg/L	5 mg/L	79.0	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.61 mg/L	0.75 mg/L	80.9	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	7.56 mg/L	10 mg/L	75.6	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.7 mg/L	1 mg/L	75.0	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: 1384699)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 1384700)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	117	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	109	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	115	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	118	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	133	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	104	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	107	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	124	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	110	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	116	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	119	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	111	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	110	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	126	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	102	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	112	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	106	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	128	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	Reference Material (RM) Report: Qualifier
Metals (QCLot: 1384700) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	121	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	118	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	111	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page ____ of ____

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

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

Service Requested (Rush for routine analysis subject to availability)
◉ Regular (Standard Turnaround Times - Business Days)
○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

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

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

Lab Work Order # (lab use only): A6320

ALS Contact: | Sampler:

Analysis Request

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA2412-A-1	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-2	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-3	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-4	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-5	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-6	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-7	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-8	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-9	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-10	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-11	20-Mar-24	9:00	Soil	X	X		X	1
	BA2412-A-12	20-Mar-24	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA24A6320

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
	26-Mar-24	0800				°C				

GENF 20.00 Front

OP 3/26/24 1130 AM