

Bottom Ash Data

2023 Week 7

The following analytical report represents bottom ash composite results for week 7 of 2023 (February 12, 2023 to February 18, 2023).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.



CERTIFICATE OF ANALYSIS

Work Order	: VA23A3828	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 21-Feb-2023 11:30
PO	: VANCO0000051998	Date Analysis Commenced	: 23-Feb-2023
C-O-C number	: ----	Issue Date	: 27-Feb-2023 09:41
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA 2307-A-1	BA 2307-A-2	BA 2307-A-3	BA 2307-A-4	BA 2307-A-5
Client sampling date / time					[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-001	VA23A3828-002	VA23A3828-003	VA23A3828-004	VA23A3828-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	21.9	22.0	22.9	22.3	22.3
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	11.4	11.4	11.5
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	51600	51500	48300	43500	42900
Antimony	7440-36-0	E440	0.10	mg/kg	103	109	127	139	122
Arsenic	7440-38-2	E440	0.10	mg/kg	16.8	17.6	19.8	21.3	18.7
Barium	7440-39-3	E440	0.50	mg/kg	713	851	642	591	738
Beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.43	0.46	0.46	0.45
Bismuth	7440-69-9	E440	0.20	mg/kg	9.52	17.2	16.6	122	11.9
Boron	7440-42-8	E440	5.0	mg/kg	174	176	178	214	262
Cadmium	7440-43-9	E440	0.020	mg/kg	7.78	7.81	10.1	11.9	9.45
Calcium	7440-70-2	E440	50	mg/kg	142000	162000	163000	172000	157000
Chromium	7440-47-3	E440	0.50	mg/kg	149	233	155	160	182
Cobalt	7440-48-4	E440	0.10	mg/kg	276	47.9	124	107	190
Copper	7440-50-8	E440	0.50	mg/kg	12800	1640	1570	2510	1420
Iron	7439-89-6	E440	50	mg/kg	45400	50300	47800	53200	57900
Lead	7439-92-1	E440	0.50	mg/kg	286	377	331	388	375
Lithium	7439-93-2	E440	2.0	mg/kg	36.9	25.8	35.6	38.7	66.9
Magnesium	7439-95-4	E440	20	mg/kg	12400	12400	12800	13800	12400
Manganese	7439-96-5	E440	1.0	mg/kg	865	1190	937	888	933
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0632	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440	0.10	mg/kg	107	68.4	79.5	88.7	87.7
Nickel	7440-02-0	E440	0.50	mg/kg	118	101	136	146	154
Phosphorus	7723-14-0	E440	50	mg/kg	11400	12300	13200	14100	12000
Potassium	7440-09-7	E440	100	mg/kg	5240	5230	6120	5860	5610
Selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.35	0.38	0.40	0.33
Silver	7440-22-4	E440	0.10	mg/kg	3.97	4.60	5.36	5.14	4.64
Sodium	7440-23-5	E440	50	mg/kg	18200	19000	20100	19400	19800
Strontium	7440-24-6	E440	0.50	mg/kg	360	323	363	370	356
Sulfur	7704-34-9	E440	1000	mg/kg	11600	12500	14900	16000	13300



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA 2307-A-1	BA 2307-A-2	BA 2307-A-3	BA 2307-A-4	BA 2307-A-5
Client sampling date / time					[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-001	VA23A3828-002	VA23A3828-003	VA23A3828-004	VA23A3828-005
					Result	Result	Result	Result	Result
Metals									
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0.051	0.054	<0.050
Tin	7440-31-5	E440	2.0	mg/kg	126	200	109	126	115
Titanium	7440-32-6	E440	1.0	mg/kg	525	612	462	331	476
Tungsten	7440-33-7	E440	0.50	mg/kg	5.79	10.2	12.0	9.69	8.68
Uranium	7440-61-1	E440	0.050	mg/kg	4.39	4.54	5.27	5.44	4.77
Vanadium	7440-62-2	E440	0.20	mg/kg	51.5	44.6	51.9	51.9	47.2
Zinc	7440-66-6	E440	2.0	mg/kg	3020	3680	3820	5850	4320
Zirconium	7440-67-7	E440	1.0	mg/kg	2.5	1.8	2.6	2.4	1.6
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.8
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.91	7.65	7.49	7.42	7.20
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units	6.55	6.29	6.42	6.43	6.68
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.83	1.71	2.00	1.86	1.66
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.092	0.086	0.080	0.160	0.060
Calcium, TCLP	7440-70-2	E444	10	mg/L	1890	1700	1780	1890	1720
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.892	1.03	1.04	1.66	1.64
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.525	0.501	0.422	0.479	0.420
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	98.1	94.6	97.5	99.2	93.5
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.45	0.47	0.42	0.51	0.33
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA 2307-A-1	BA 2307-A-2	BA 2307-A-3	BA 2307-A-4	BA 2307-A-5
					Client sampling date / time	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-001	VA23A3828-002	VA23A3828-003	VA23A3828-004	VA23A3828-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	18.4	24.9	20.0	15.8	8.50	
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA 2307-A-6	BA 2307-A-7	BA 2307-A-8	BA 2307-A-9	BA 2307-A-10
Client sampling date / time					[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-006	VA23A3828-007	VA23A3828-008	VA23A3828-009	VA23A3828-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	22.1	21.9	21.2	21.5	22.4
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.5	11.6	11.7	11.5
Metals									
Aluminum	7429-90-5	E440	50	mg/kg	47900	40400	46600	53500	53700
Antimony	7440-36-0	E440	0.10	mg/kg	128	134	145	109	140
Arsenic	7440-38-2	E440	0.10	mg/kg	15.0	20.4	17.9	18.0	20.4
Barium	7440-39-3	E440	0.50	mg/kg	741	834	719	793	741
Beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.55	0.40	0.51	0.48
Bismuth	7440-69-9	E440	0.20	mg/kg	11.7	14.7	65.6	10.2	16.4
Boron	7440-42-8	E440	5.0	mg/kg	215	196	207	250	187
Cadmium	7440-43-9	E440	0.020	mg/kg	7.13	8.65	8.65	10.2	9.60
Calcium	7440-70-2	E440	50	mg/kg	142000	175000	162000	156000	161000
Chromium	7440-47-3	E440	0.50	mg/kg	115	150	312	185	161
Cobalt	7440-48-4	E440	0.10	mg/kg	45.3	62.7	38.0	78.7	708
Copper	7440-50-8	E440	0.50	mg/kg	1850	1380	2080	2470	2380
Iron	7439-89-6	E440	50	mg/kg	54600	52100	48500	55900	49700
Lead	7439-92-1	E440	0.50	mg/kg	346	335	492	384	539
Lithium	7439-93-2	E440	2.0	mg/kg	25.0	31.1	31.3	38.7	84.2
Magnesium	7439-95-4	E440	20	mg/kg	10700	15100	12000	14000	13100
Manganese	7439-96-5	E440	1.0	mg/kg	861	1250	1140	1110	927
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440	0.10	mg/kg	109	85.6	67.0	98.6	87.3
Nickel	7440-02-0	E440	0.50	mg/kg	115	140	199	147	128
Phosphorus	7723-14-0	E440	50	mg/kg	11600	14800	12700	11600	12800
Potassium	7440-09-7	E440	100	mg/kg	5860	5780	5660	5670	5560
Selenium	7782-49-2	E440	0.20	mg/kg	0.24	0.42	0.38	0.32	0.30
Silver	7440-22-4	E440	0.10	mg/kg	6.18	4.44	5.22	4.08	4.11
Sodium	7440-23-5	E440	50	mg/kg	18900	18900	18500	20200	19200
Strontium	7440-24-6	E440	0.50	mg/kg	313	417	379	426	348
Sulfur	7704-34-9	E440	1000	mg/kg	11300	13600	13800	13600	13300



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA 2307-A-6	BA 2307-A-7	BA 2307-A-8	BA 2307-A-9	BA 2307-A-10
Client sampling date / time					[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-006	VA23A3828-007	VA23A3828-008	VA23A3828-009	VA23A3828-010	
					Result	Result	Result	Result	Result	
Metals										
Thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.053	0.053	0.087	0.056	
Tin	7440-31-5	E440	2.0	mg/kg	411	128	170	112	114	
Titanium	7440-32-6	E440	1.0	mg/kg	416	472	448	572	438	
Tungsten	7440-33-7	E440	0.50	mg/kg	6.18	8.27	8.48	8.07	7.17	
Uranium	7440-61-1	E440	0.050	mg/kg	4.26	5.08	5.00	5.30	5.14	
Vanadium	7440-62-2	E440	0.20	mg/kg	42.2	50.3	64.4	52.9	47.3	
Zinc	7440-66-6	E440	2.0	mg/kg	8460	3710	4100	4130	4100	
Zirconium	7440-67-7	E440	1.0	mg/kg	2.6	1.2	1.3	1.9	3.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.9	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.37	6.77	6.76	7.26	7.88	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.60	6.41	6.43	6.69	6.51	
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.72	1.62	1.48	1.39	1.65	
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.080	0.093	0.077	0.056	0.073	
Calcium, TCLP	7440-70-2	E444	10	mg/L	1820	1680	1510	1400	1700	
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.862	1.66	1.39	0.765	0.832	
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.623	0.422	0.387	0.362	0.437	
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	100	96.3	83.8	81.0	98.4	
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.40	0.46	0.35	0.28	0.42	
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA 2307-A-6	BA 2307-A-7	BA 2307-A-8	BA 2307-A-9	BA 2307-A-10
					Client sampling date / time	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]	[21-Feb-2023]
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-006	VA23A3828-007	VA23A3828-008	VA23A3828-009	VA23A3828-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	16.3	18.2	12.8	12.4	16.8	16.8
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID		BA 2307-A-11	BA 2307-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		[21-Feb-2023]	[21-Feb-2023]	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-011	VA23A3828-012	-----	-----	-----		
					Result	Result	----	----	----		
Physical Tests											
Moisture	----	E144	0.25	%	22.2	22.7	----	----	----		
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	----	----	----		
Metals											
Aluminum	7429-90-5	E440	50	mg/kg	52600	42200	----	----	----		
Antimony	7440-36-0	E440	0.10	mg/kg	123	104	----	----	----		
Arsenic	7440-38-2	E440	0.10	mg/kg	26.0	16.6	----	----	----		
Barium	7440-39-3	E440	0.50	mg/kg	766	665	----	----	----		
Beryllium	7440-41-7	E440	0.10	mg/kg	0.48	0.42	----	----	----		
Bismuth	7440-69-9	E440	0.20	mg/kg	10.7	9.64	----	----	----		
Boron	7440-42-8	E440	5.0	mg/kg	281	192	----	----	----		
Cadmium	7440-43-9	E440	0.020	mg/kg	9.01	8.20	----	----	----		
Calcium	7440-70-2	E440	50	mg/kg	172000	157000	----	----	----		
Chromium	7440-47-3	E440	0.50	mg/kg	213	152	----	----	----		
Cobalt	7440-48-4	E440	0.10	mg/kg	204	63.9	----	----	----		
Copper	7440-50-8	E440	0.50	mg/kg	2100	1860	----	----	----		
Iron	7439-89-6	E440	50	mg/kg	55100	50400	----	----	----		
Lead	7439-92-1	E440	0.50	mg/kg	364	585	----	----	----		
Lithium	7439-93-2	E440	2.0	mg/kg	43.7	29.8	----	----	----		
Magnesium	7439-95-4	E440	20	mg/kg	12800	12300	----	----	----		
Manganese	7439-96-5	E440	1.0	mg/kg	1000	822	----	----	----		
Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----		
Molybdenum	7439-98-7	E440	0.10	mg/kg	82.7	290	----	----	----		
Nickel	7440-02-0	E440	0.50	mg/kg	169	124	----	----	----		
Phosphorus	7723-14-0	E440	50	mg/kg	13500	13000	----	----	----		
Potassium	7440-09-7	E440	100	mg/kg	5660	5460	----	----	----		
Selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.27	----	----	----		
Silver	7440-22-4	E440	0.10	mg/kg	4.59	4.20	----	----	----		
Sodium	7440-23-5	E440	50	mg/kg	19800	18500	----	----	----		
Strontium	7440-24-6	E440	0.50	mg/kg	352	337	----	----	----		
Sulfur	7704-34-9	E440	1000	mg/kg	13400	12000	----	----	----		



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA 2307-A-11	BA 2307-A-12	----	----	----
					[21-Feb-2023]	[21-Feb-2023]	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-011	VA23A3828-012	-----	-----	-----
					Result	Result	----	----	----
Metals									
Thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg	113	95.2	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg	475	379	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	8.85	6.15	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	5.25	4.78	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	51.1	43.9	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	5280	3320	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.7	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.18	6.66	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.26	6.47	----	----	----
Antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444	0.50	mg/L	1.60	1.52	----	----	----
Cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.107	0.111	----	----	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	1620	1580	----	----	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.13	0.777	----	----	----
Copper, TCLP	7440-50-8	E444	0.050	mg/L	0.648	0.298	----	----	----
Iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	90.8	87.7	----	----	----
Mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.57	0.36	----	----	----
Selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID		BA 2307-A-11	BA 2307-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		[21-Feb-2023]	[21-Feb-2023]	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3828-011	VA23A3828-012	-----	-----	-----	-----	-----
					Result	Result	----	----	----	----	----
TCLP Metals											
Thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	----	----
Uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	----	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	----	----
Zinc, TCLP	7440-66-6	E444	0.50	mg/L	28.4	15.2	----	----	----	----	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA23A3828</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO0000051998</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 21-Feb-2023 11:30</p> <p>Issue Date : 27-Feb-2023 09:41</p>
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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	VA23A3828-001	BA 2307-A-1	Antimony	7440-36-0	E440	30.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Bismuth	7440-69-9	E440	48.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Cadmium	7440-43-9	E440	53.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Cobalt	7440-48-4	E440	65.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Copper	7440-50-8	E440	149 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Lead	7439-92-1	E440	82.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Nickel	7440-02-0	E440	40.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Titanium	7440-32-6	E440	62.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Tungsten	7440-33-7	E440	59.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A3828-001	BA 2307-A-1	Zinc	7440-66-6	E440	42.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



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 Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-1	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-10	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-11	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-12	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-2	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-3	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2307-A-4	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✓



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA 2307-A-5	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA 2307-A-6	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA 2307-A-7	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA 2307-A-8	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA 2307-A-9	E510	21-Feb-2023	24-Feb-2023	----	----		25-Feb-2023	28 days	5 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-1	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-10	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-11	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-12	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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 ICMS											
LDPE bag BA 2307-A-2	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-3	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-4	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-5	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-6	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-7	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-8	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA 2307-A-9	E440	21-Feb-2023	24-Feb-2023	----	----		26-Feb-2023	180 days	6 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA 2307-A-1	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----		



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-10	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-11	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-12	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-2	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-3	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-4	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-5	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-6	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2307-A-7	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA 2307-A-8	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA 2307-A-9	E144	21-Feb-2023	----	----	----		23-Feb-2023	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-1	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-10	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-11	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-12	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-2	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-3	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-4	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-5	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-6	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-7	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-8	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA 2307-A-9	E108	21-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	30 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-1	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-10	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-11	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-12	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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 : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-2	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-3	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-4	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-5	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-6	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-7	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-8	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA 2307-A-9	E512	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	28 days	4 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA 2307-A-1	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-10	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-11	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-12	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-2	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-3	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-4	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-5	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-6	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-7	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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 : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-8	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2307-A-9	E444	23-Feb-2023	24-Feb-2023	----	----		24-Feb-2023	180 days	4 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-1	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-10	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-11	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-12	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-2	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-3	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-4	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group 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: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-5	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-6	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-7	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-8	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA 2307-A-9	EPP444	21-Feb-2023	23-Feb-2023	----	----		----	----	----	

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	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	843744	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	843745	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	843748	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	843747	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	843744	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	843745	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	843748	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	843747	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	844924	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	843744	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	844925	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	843745	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	843748	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	844924	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	844925	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 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) 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 Vancouver - Environmental	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 Vancouver - Environmental	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 HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, 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 Vancouver - Environmental	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 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	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 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

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 Work Order : VA23A3828
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	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	: VA23A3828	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 21-Feb-2023 11:30
PO	: VANCO0000051998	Date Analysis Commenced	: 23-Feb-2023
C-O-C number	: ----	Issue Date	: 27-Feb-2023 09:41
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia



General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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



Laboratory Duplicate (DUP) Report

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

Sub-Matrix: Soil/Solid

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 843747)											
VA23A3828-001	BA 2307-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	0.2%	5%	----
Physical Tests (QC Lot: 843748)											
VA23A3828-001	BA 2307-A-1	Moisture	----	E144	0.25	%	21.9	22.7	3.68%	20%	----
Metals (QC Lot: 843744)											
VA23A3828-001	BA 2307-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 843745)											
VA23A3828-001	BA 2307-A-1	Aluminum	7429-90-5	E440	50	mg/kg	51600	38200	29.9%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	103	139	30.1%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	16.8	21.5	24.8%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	713	608	15.9%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.48	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.52	15.6	48.8%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	174	198	13.0%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	7.78	13.5	53.5%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	142000	170000	17.4%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	149	151	1.60%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	276	139	65.8%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	12800	1890	149%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	45400	55300	19.6%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	286	684	82.0%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	36.9	42.9	15.2%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12400	13800	10.5%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	865	965	10.9%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	107	83.2	24.9%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	118	178	40.2%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	11400	14200	21.3%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5240	6040	14.1%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.38	0.12	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	3.97	4.45	11.4%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	18200	19900	8.94%	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: 843745) - continued											
VA23A3828-001	BA 2307-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	360	392	8.68%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11600	14700	23.9%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.053	0.003	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	126	144	13.3%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	525	275	62.6%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	5.79	10.6	59.0%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	4.39	5.44	21.3%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	51.5	48.4	6.20%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3020	4670	42.9%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.5	1.4	1.0	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: 843748)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 843744)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 843745)						
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: 843745) - 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: 844924)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 844925)						
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: 843747)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 843748)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 843744)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.2	80.0	120	----
Metals (QCLot: 843745)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	107	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	115	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	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	105	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	103	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.7	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.7	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.6	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	109	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	111	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	111	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.8	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	88.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	111	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	110	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	107	80.0	120	----



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 843745) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	100	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	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: 844924)										
VA23A3828-001	BA 2307-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	103	50.0	140	----
TCLP Metals (QCLot: 844925)										
VA23A3828-001	BA 2307-A-1	Antimony, TCLP	7440-36-0	E444	4.14 mg/L	5 mg/L	82.9	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	3.8 mg/L	5 mg/L	75.3	50.0	140	----
		Barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	101	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.197 mg/L	0.25 mg/L	78.7	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.28 mg/L	10 mg/L	82.8	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.196 mg/L	0.25 mg/L	78.3	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	0.95 mg/L	1.25 mg/L	76.4	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	1.80 mg/L	2.5 mg/L	72.1	50.0	140	----
		Iron, TCLP	7439-89-6	E444	190 mg/L	250 mg/L	76.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.35 mg/L	10 mg/L	83.5	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	205 mg/L	250 mg/L	82.0	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	1.86 mg/L	2.5 mg/L	74.3	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	3.73 mg/L	5 mg/L	74.5	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.083 mg/L	0.1 mg/L	82.6	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.2 mg/L	5 mg/L	84.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.08 mg/L	5 mg/L	81.6	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.58 mg/L	0.75 mg/L	76.9	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	7 mg/L	10 mg/L	73.9	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:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 843744)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	97.9	70.0	130	----
Metals (QCLot: 843745)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	94.1	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	107	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	111	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	105	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	101	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	110	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	116	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	101	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	111	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	103	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	86.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	90.8	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	113	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----

Page : 11 of 11
 Work Order : VA23A3828
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 843745) - continued									
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	106	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	104	70.0	130	----



Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)		
Contact:	Nicole Victor / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	nvictor@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
	Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
			brent.kirkpatrick@metrovancover.org		Analysis Request	
			Sarah.Wellman@metrovancover.org			

Invoice To		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)							
Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:									
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		PO / AFE:	PO#_VANCO 0000051998 Weekly Bottom As								
Company:		LSD:	(includes 2:1 pH)								
Contact:		Quote #:									
Address:											
Phone:											
Fax:											
Lab/Work Order # (lab use only)		ALS Contact:		Sampler:							

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		
BA 2307-A-1			9:00	Soil	X	X		X			1
BA 2307-A-2			9:00	Soil	X	X		X			1
BA 2307-A-3			9:00	Soil	X	X		X			1
BA 2307-A-4			9:00	Soil	X	X		X			1
BA 2307-A-5			9:00	Soil	X	X		X			1
BA 2307-A-6			9:00	Soil	X	X		X			1
BA 2307-A-7			9:00	Soil	X	X		X			1
BA 2307-A-8			9:00	Soil	X	X		X			1
BA 2307-A-9			9:00	Soil	X	X		X			1
BA 2307-A-10			9:00	Soil	X	X		X			1
BA 2307-A-11			9:00	Soil	X	X		X			1
BA 2307-A-12			9:00	Soil	X	X		X			1

Environmental Division
 Vancouver
 Work Order Reference
VA23A3828



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
<i>[Signature]</i>	21/03/23	9:00	CW	Feb 21	1130	17 °C				