

Bottom Ash Data

2022 Week 49

The following analytical report represents bottom ash composite results for week 49 of 2022 (December 4, 2022 to December 10, 2022).

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



CERTIFICATE OF ANALYSIS

<p>Work Order : VA22D0167</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 : VANCO 0000051213</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : (includes 2:1 pH)</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 11</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 13-Dec-2022 12:05</p> <p>Date Analysis Commenced : 15-Dec-2022</p> <p>Issue Date : 30-Dec-2022 14:53</p>
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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>
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
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	BA2249-A-1	BA2249-A-2	BA2249-A-3	BA2249-A-4	BA2249-A-5
(Matrix: Soil/Solid)					Client sampling date / time	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-001	VA22D0167-002	VA22D0167-003	VA22D0167-004	VA22D0167-005	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	----	E144	0.25	%	26.9	25.6	23.3	27.9	29.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.4	10.4	10.5	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	35200	41600	61400	37400	41100	
antimony	7440-36-0	E440	0.10	mg/kg	150	164	168	146	152	
arsenic	7440-38-2	E440	0.10	mg/kg	21.8	22.7	24.0	30.5	20.1	
barium	7440-39-3	E440	0.50	mg/kg	468	540	488	449	504	
beryllium	7440-41-7	E440	0.10	mg/kg	0.72	0.36	0.41	0.40	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	11.6	8.30	10.4	7.66	10.0	
boron	7440-42-8	E440	5.0	mg/kg	202	282	182	295	262	
cadmium	7440-43-9	E440	0.020	mg/kg	10.4	9.92	10.7	9.21	8.24	
calcium	7440-70-2	E440	50	mg/kg	150000	141000	158000	160000	161000	
chromium	7440-47-3	E440	0.50	mg/kg	262	340	197	216	235	
cobalt	7440-48-4	E440	0.10	mg/kg	39.8	60.1	778	73.8	43.6	
Copper	7440-50-8	E440	0.50	mg/kg	2250	2480	28100	15200	2230	
iron	7439-89-6	E440	50	mg/kg	54800	59000	41500	61100	44100	
lead	7439-92-1	E440	0.50	mg/kg	950	1010	3770	721	504	
lithium	7439-93-2	E440	2.0	mg/kg	24.4	25.7	42.2	26.9	28.3	
magnesium	7439-95-4	E440	20	mg/kg	12300	11200	12600	12600	12900	
manganese	7439-96-5	E440	1.0	mg/kg	800	892	945	837	833	
mercury	7439-97-6	E510	0.0500	mg/kg	0.151	0.130	0.113	0.148	0.106	
molybdenum	7439-98-7	E440	0.10	mg/kg	30.2	62.6	23.3	20.6	22.3	
nickel	7440-02-0	E440	0.50	mg/kg	274	272	244	228	201	
phosphorus	7723-14-0	E440	50	mg/kg	12600	12300	14200	11600	13000	
potassium	7440-09-7	E440	100	mg/kg	5980	5680	6240	6010	5840	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.88	0.42	0.36	0.35	
Silver	7440-22-4	E440	0.10	mg/kg	8.92	11.4	16.0	10.0	9.40	
sodium	7440-23-5	E440	50	mg/kg	19400	20200	22300	20700	20300	
strontium	7440-24-6	E440	0.50	mg/kg	326	314	358	318	350	



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2249-A-1	BA2249-A-2	BA2249-A-3	BA2249-A-4	BA2249-A-5
Client sampling date / time					07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-001	VA22D0167-002	VA22D0167-003	VA22D0167-004	VA22D0167-005
					Result	Result	Result	Result	Result
Metals									
sulfur	7704-34-9	E440	1000	mg/kg	13700	13000	14900	13600	14400
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.054	0.052	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg	125	114	193	261	111
titanium	7440-32-6	E440	1.0	mg/kg	361	456	542	387	482
tungsten	7440-33-7	E440	0.50	mg/kg	79.9	82.2	97.8	64.7	49.7
uranium	7440-61-1	E440	0.050	mg/kg	2.76	2.87	3.09	2.58	2.71
vanadium	7440-62-2	E440	0.20	mg/kg	33.7	35.3	39.2	37.0	44.4
zinc	7440-66-6	E440	2.0	mg/kg	5480	7150	4390	4390	4190
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	3.0	3.8	2.0	2.0
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.2	11.2	11.3	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.38	5.36	5.90	5.75	6.73
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91
pH, TCLP final	----	EPP444	0.010	pH units	6.25	6.22	6.20	6.39	6.36
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	1.87	2.05	1.90	1.98	2.00
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.131	0.128	0.117	0.109	0.109
calcium, TCLP	7440-70-2	E444	10	mg/L	1800	1890	1800	1860	1900
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	2.36	1.89	1.63	0.980	2.26
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.953	0.748	1.39	1.06	0.868
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	0.42	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	114	116	117	120	125
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	0.57	0.59	0.87	0.50	0.68
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA2249-A-1	BA2249-A-2	BA2249-A-3	BA2249-A-4	BA2249-A-5
					Client sampling date / time	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-001	VA22D0167-002	VA22D0167-003	VA22D0167-004	VA22D0167-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
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	33.1	33.8	45.4	40.3	32.6	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<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)

					BA2249-A-6	BA2249-A-7	BA2249-A-8	BA2249-A-9	BA2249-A-10
Client sampling date / time					07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-006	VA22D0167-007	VA22D0167-008	VA22D0167-009	VA22D0167-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144	0.25	%	25.5	24.3	25.8	26.5	26.9
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	10.3	10.5	10.6
Metals									
aluminum	7429-90-5	E440	50	mg/kg	34500	33300	41400	34400	39600
antimony	7440-36-0	E440	0.10	mg/kg	140	140	160	131	156
arsenic	7440-38-2	E440	0.10	mg/kg	22.9	19.7	21.4	19.4	21.2
barium	7440-39-3	E440	0.50	mg/kg	409	545	417	514	495
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.34	0.33	0.39	0.40
bismuth	7440-69-9	E440	0.20	mg/kg	9.16	14.7	8.76	8.36	7.84
boron	7440-42-8	E440	5.0	mg/kg	210	258	176	177	230
cadmium	7440-43-9	E440	0.020	mg/kg	11.9	12.2	8.47	7.65	10.4
calcium	7440-70-2	E440	50	mg/kg	157000	145000	141000	143000	148000
chromium	7440-47-3	E440	0.50	mg/kg	179	303	888	194	413
cobalt	7440-48-4	E440	0.10	mg/kg	86.0	227	85.3	96.9	90.0
Copper	7440-50-8	E440	0.50	mg/kg	5280	15200	5200	4310	3620
iron	7439-89-6	E440	50	mg/kg	67300	64300	45700	75400	64400
lead	7439-92-1	E440	0.50	mg/kg	539	552	603	562	1090
lithium	7439-93-2	E440	2.0	mg/kg	28.0	27.9	28.6	28.4	31.4
magnesium	7439-95-4	E440	20	mg/kg	12000	11600	12200	10700	12200
manganese	7439-96-5	E440	1.0	mg/kg	1040	975	855	984	1120
mercury	7439-97-6	E510	0.0500	mg/kg	0.120	0.0978	0.152	0.212	0.0779
molybdenum	7439-98-7	E440	0.10	mg/kg	36.5	45.1	26.9	22.0	23.9
nickel	7440-02-0	E440	0.50	mg/kg	604	972	625	1200	272
phosphorus	7723-14-0	E440	50	mg/kg	13000	10500	12000	11100	12800
potassium	7440-09-7	E440	100	mg/kg	5620	5360	5370	5130	5700
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.34	0.38	0.41	0.37
Silver	7440-22-4	E440.Ag	0.10	mg/kg	>121	11.8	----	15.1	----
Silver	7440-22-4	E440	0.10	mg/kg	----	----	7.95	----	9.25
sodium	7440-23-5	E440	50	mg/kg	18300	18000	17600	17800	18900
strontium	7440-24-6	E440	0.50	mg/kg	316	296	333	331	325



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2249-A-6	BA2249-A-7	BA2249-A-8	BA2249-A-9	BA2249-A-10
Client sampling date / time					07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-006	VA22D0167-007	VA22D0167-008	VA22D0167-009	VA22D0167-010
					Result	Result	Result	Result	Result
Metals									
sulfur	7704-34-9	E440	1000	mg/kg	14000	11600	12800	13100	13900
thallium	7440-28-0	E440	0.050	mg/kg	0.054	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg	158	176	126	125	116
titanium	7440-32-6	E440	1.0	mg/kg	339	529	330	482	468
tungsten	7440-33-7	E440	0.50	mg/kg	113	142	134	105	82.9
uranium	7440-61-1	E440	0.050	mg/kg	2.85	2.51	2.76	2.72	2.76
vanadium	7440-62-2	E440	0.20	mg/kg	34.1	33.9	40.7	37.4	36.3
zinc	7440-66-6	E440	2.0	mg/kg	5440	4310	4630	5640	7720
zirconium	7440-67-7	E440	1.0	mg/kg	3.1	1.8	3.5	1.6	1.9
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.2	11.2	11.2	11.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.36	6.26	5.81	5.36	5.13
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91
pH, TCLP final	----	EPP444	0.010	pH units	6.22	6.17	6.13	6.40	6.26
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	1.98	1.92	1.84	1.94	1.93
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.200	0.158	0.226	0.129	0.100
calcium, TCLP	7440-70-2	E444	10	mg/L	1820	1780	1750	1890	1790
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	1.95	1.40	1.04	1.24	2.11
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.46	1.20	1.39	1.06	1.28
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	114	116	108	118	116
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	0.49	0.53	0.50	0.58	0.64
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10



Analytical Results

Sub-Matrix: Soil/Solid

(Matrix: Soil/Solid)

					Client sample ID	BA2249-A-6	BA2249-A-7	BA2249-A-8	BA2249-A-9	BA2249-A-10
					Client sampling date / time	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00	07-Dec-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-006	VA22D0167-007	VA22D0167-008	VA22D0167-009	VA22D0167-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
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	35.3	33.8	49.8	27.5	28.9	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<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)

					BA2249-A-11	BA2249-A-12	----	----	----
					07-Dec-2022 09:00	07-Dec-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-011	VA22D0167-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	----	E144	0.25	%	28.9	24.7	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.3	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	47700	35000	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	139	177	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	21.2	23.5	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	404	502	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.77	0.37	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	8.40	9.68	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	219	185	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	9.03	18.0	----	----	----
calcium	7440-70-2	E440	50	mg/kg	150000	145000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	202	224	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	373	62.8	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	2660	2000	----	----	----
iron	7439-89-6	E440	50	mg/kg	42200	72500	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	637	1550	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	33.9	25.4	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	12400	11300	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	842	1010	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.108	0.100	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	27.9	27.3	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	409	222	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	12900	12000	----	----	----
potassium	7440-09-7	E440	100	mg/kg	5730	5470	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.45	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	10.4	17.7	----	----	----
sodium	7440-23-5	E440	50	mg/kg	18900	18200	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	315	322	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	14200	12700	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2249-A-11	BA2249-A-12	----	----	----
Client sampling date / time					07-Dec-2022 09:00	07-Dec-2022 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-011	VA22D0167-012	-----	-----	-----
					Result	Result	---	---	---
Metals									
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---
tin	7440-31-5	E440	2.0	mg/kg	124	268	---	---	---
titanium	7440-32-6	E440	1.0	mg/kg	424	383	---	---	---
tungsten	7440-33-7	E440	0.50	mg/kg	63.2	95.6	---	---	---
uranium	7440-61-1	E440	0.050	mg/kg	2.66	2.61	---	---	---
vanadium	7440-62-2	E440	0.20	mg/kg	38.2	38.3	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg	3900	5300	---	---	---
zirconium	7440-67-7	E440	1.0	mg/kg	3.4	2.2	---	---	---
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.2	---	---	---
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	5.16	5.65	---	---	---
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	---	---	---
pH, TCLP final	----	EPP444	0.010	pH units	6.42	6.22	---	---	---
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	1.97	1.87	---	---	---
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.107	0.100	---	---	---
calcium, TCLP	7440-70-2	E444	10	mg/L	1910	1790	---	---	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.35	1.30	---	---	---
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.14	1.08	---	---	---
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	124	119	---	---	---
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.87	0.75	---	---	---
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

(Matrix: Soil/Solid)

					Client sample ID	BA2249-A-11	BA2249-A-12	----	----	----
					Client sampling date / time	07-Dec-2022 09:00	07-Dec-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22D0167-011	VA22D0167-012	-----	-----	-----	
					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	30.3	37.4	----	----	----	
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 : VA22D0167</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 : VANCO 0000051213</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : (includes 2:1 pH)</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 15</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 : 13-Dec-2022 12:05</p> <p>Issue Date : 30-Dec-2022 14:53</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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- 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.



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 : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2249-A-6	E440.Ag	07-Dec-2022	29-Dec-2022	180 days	22 days	✓	30-Dec-2022	158 days	1 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2249-A-7	E440.Ag	07-Dec-2022	29-Dec-2022	180 days	22 days	✓	30-Dec-2022	158 days	1 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2249-A-9	E440.Ag	07-Dec-2022	29-Dec-2022	180 days	22 days	✓	30-Dec-2022	158 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-1	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-10	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-11	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-12	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 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 BA2249-A-2	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-3	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-4	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-5	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-6	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-7	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-8	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2249-A-9	E510	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2249-A-1	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 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 BA2249-A-10	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-11	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-12	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-2	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-3	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-4	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-5	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-6	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2249-A-7	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 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 ICPMS											
LDPE bag BA2249-A-8	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2249-A-9	E440	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	180 days	16 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-1	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-10	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-11	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-12	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-2	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-3	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-4	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		



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 BA2249-A-5	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-6	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-7	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-8	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2249-A-9	E144	07-Dec-2022	----	----	----		19-Dec-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-1	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-10	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-11	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-12	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 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 BA2249-A-2	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-3	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-4	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-5	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-6	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-7	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-8	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2249-A-9	E108	07-Dec-2022	22-Dec-2022	----	----		22-Dec-2022	30 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-1	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 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) BA2249-A-10	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-11	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-12	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-2	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-3	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-4	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-5	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-6	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-7	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 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) BA2249-A-8	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2249-A-9	E512	15-Dec-2022	21-Dec-2022	----	----		21-Dec-2022	28 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-1	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-10	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-11	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-12	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-2	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-3	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-4	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 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) BA2249-A-5	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-6	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-7	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-8	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2249-A-9	E444	15-Dec-2022	20-Dec-2022	----	----		21-Dec-2022	180 days	14 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-1	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-10	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-11	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-12	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----		



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) BA2249-A-2	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-3	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-4	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-5	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-6	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-7	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-8	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2249-A-9	EPP444	07-Dec-2022	15-Dec-2022	----	----		----	----	----	

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	783846	1	18	5.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	783847	2	18	11.1	5.0	✔
Moisture Content by Gravimetry	E144	783851	1	15	6.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	783848	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	791232	1	3	33.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	783846	2	18	11.1	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	783847	3	18	16.6	10.0	✔
Moisture Content by Gravimetry	E144	783851	1	15	6.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	783848	1	18	5.5	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	791232	1	3	33.3	5.0	✔
Mercury by CVAAS (TCLP)	E512	784966	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	783846	1	18	5.5	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	784967	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	783847	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	783851	1	15	6.6	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	784966	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	784967	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 ± 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 °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, 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are 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. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. 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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 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.
Digestion for Silver	EP440.Ag 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	: VA22D0167	Page	: 1 of 12
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	: 13-Dec-2022 12:05
PO	: VANCO 0000051213	Date Analysis Commenced	: 15-Dec-2022
C-O-C number	: ----	Issue Date	: 30-Dec-2022 14:53
Sampler	: ----		
Site	: (includes 2:1 pH)		
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>
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
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: 783848)											
VA22D0104-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.55	7.74	2.5%	5%	----
Physical Tests (QC Lot: 783851)											
VA22D0104-002	Anonymous	Moisture	----	E144	0.25	%	4.58	4.63	1.17%	20%	----
Metals (QC Lot: 783846)											
VA22D0104-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0054	0.0053	0.0002	Diff <2x LOR	----
Metals (QC Lot: 783847)											
VA22D0104-001	Anonymous	Copper	7440-50-8	E440	0.50	mg/kg	16.7	14.8	12.2%	30%	----
VA22D0104-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	11000	10500	4.24%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.29	0.42	0.12	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	2.05	1.89	8.20%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	60.0	58.2	2.94%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.12	0.11	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.054	0.070	0.016	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	6080	5720	6.13%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	11.2	10.3	8.46%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	4.70	4.17	11.8%	30%	----
		iron	7439-89-6	E440	50	mg/kg	15400	14400	7.03%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	4.65	4.16	11.1%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	3.4	3.1	0.3	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	2800	2670	4.82%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	271	245	10.00%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.24	0.25	0.01	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	6.35	5.11	21.7%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	399	323	21.0%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	760	740	3.11%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	649	626	3.64%	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: 783847) - continued											
VA22D0104-001	Anonymous	strontium	7440-24-6	E440	0.50	mg/kg	52.8	48.3	8.86%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	870	759	13.7%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.401	0.359	11.0%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	51.7	48.0	7.50%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	25.1	24.9	1.00%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.4	2.2	0.2	Diff <2x LOR	----



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: 783851)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 783846)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 783847)						
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: 783847) - 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	----
Metals (QCLot: 791232)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 784966)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 784967)						
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: 783848)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 783851)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 783846)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	87.4	80.0	120	----
Metals (QCLot: 783847)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.1	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.4	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.1	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	89.0	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.0	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.2	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.1	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.8	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.3	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	81.9	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	85.9	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.4	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.0	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	90.6	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	92.0	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.2	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.9	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	86.1	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: 783847) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.0	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.4	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	90.6	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	100	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	95.9	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.8	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	101	80.0	120	----
Metals (QCLot: 791232)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	100	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: 784966)										
VA22D0167-001	BA2249-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.2	50.0	140	----
TCLP Metals (QCLot: 784967)										
VA22D0167-001	BA2249-A-1	antimony, TCLP	7440-36-0	E444	4.50 mg/L	5 mg/L	89.9	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.5 mg/L	5 mg/L	90.3	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.5 mg/L	12.5 mg/L	92.0	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.222 mg/L	0.25 mg/L	88.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.31 mg/L	10 mg/L	83.1	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.223 mg/L	0.25 mg/L	89.2	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	1.10 mg/L	1.25 mg/L	88.1	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.04 mg/L	2.5 mg/L	81.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	216 mg/L	250 mg/L	86.2	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.31 mg/L	10 mg/L	83.1	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	214 mg/L	250 mg/L	85.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.14 mg/L	2.5 mg/L	85.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.48 mg/L	5 mg/L	89.5	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.097 mg/L	0.1 mg/L	97.3	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.3 mg/L	5 mg/L	85.6	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.38 mg/L	5 mg/L	87.6	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.67 mg/L	0.75 mg/L	89.2	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	8 mg/L	10 mg/L	80.2	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: 783846)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.2	70.0	130	----
Metals (QCLot: 783847)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	101	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	101	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	112	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.4	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	25 mg/kg	101	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	96.8	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	109	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	96.5	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	99.6	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	96.9	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	104	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	115	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	95.5	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	112	70.0	130	----

Page : 12 of 12
 Work Order : VA22D0167
 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: 783847) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	104	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	98.3	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	101	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: Steve McKinney / Dan Skrypnik		<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Address: 5150 Riverbend Drive Burnaby BC		Email 1: smckinney@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone: 604-521-1025		Email 2: rjohnson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No		Email 3: dskrypnik@covanta.com		Analysis Request	
		brent.kirkpatrick@metrovancover.org			
		Sarah.Wellman@metrovancover.org			

Invoice To Same as Report ?		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)																																								
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:		<table border="1"> <tr> <td rowspan="5">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="5">MOISTURE</td> <td rowspan="5">Chrome 6</td> <td rowspan="5">MET-CSR-FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="5">Number of Containers</td> </tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)							Number of Containers																								
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)																		Number of Containers																							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																										
Contact:		LSD: (includes 2:1 pH)																																										
Address:		Quote #:																																										
Phone: _____ Fax: _____		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
BA2249-A-1		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-2		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-3		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-4		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-5		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-6		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-7		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-8		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-9		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-10		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-11		07-Dec-22	9:00	Soil	X	X		X							1
BA2249-A-12		07-Dec-22	9:00	Soil	X	X		X							1

Environmental Division
 Vancouver
 Work Order Reference
VA22D0167

Telephone : +1 604 253 4188

Special Instructions: _____
 (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:
Kanem	13/12/22	9:00	JC	13 Dec 22	12:05pm	18, 19 °C				Yes/No? If Yes add SIF