

Bottom Ash Data

2022 Week 46

The following analytical report represents bottom ash composite results for week 46 of 2022 (November 13, 2022 to November 19, 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 : VA22C8349</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 : 22-Nov-2022 12:00</p> <p>Date Analysis Commenced : 22-Nov-2022</p> <p>Issue Date : 30-Nov-2022 08:09</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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia
Qammar Almas	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)					BA2246-A-1	BA2246-A-2	BA2246-A-3	BA2246-A-4	BA2246-A-5
Client sampling date / time					16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-001	VA22C8349-002	VA22C8349-003	VA22C8349-004	VA22C8349-005
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	23.7	23.1	22.3	22.8	22.8
pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.3	10.3	10.3	10.2
Metals									
aluminum	7429-90-5	E440	50	mg/kg	37700	33800	34400	31800	42900
antimony	7440-36-0	E440	0.10	mg/kg	140	146	133	158	141
arsenic	7440-38-2	E440	0.10	mg/kg	31.5	33.3	38.0	31.2	31.3
barium	7440-39-3	E440	0.50	mg/kg	527	556	495	513	557
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.37	0.33	0.42	0.36
bismuth	7440-69-9	E440	0.20	mg/kg	7.51	8.54	15.6	8.35	8.52
boron	7440-42-8	E440	5.0	mg/kg	188	194	202	222	175
cadmium	7440-43-9	E440	0.020	mg/kg	9.29	11.4	9.84	8.96	10.6
calcium	7440-70-2	E440	50	mg/kg	148000	157000	156000	154000	150000
chromium	7440-47-3	E440	0.50	mg/kg	191	197	202	182	197
cobalt	7440-48-4	E440	0.10	mg/kg	62.8	47.9	93.8	98.8	100
copper	7440-50-8	E440	0.50	mg/kg	1620	2110	2220	3290	2500
iron	7439-89-6	E440	50	mg/kg	59300	50500	63300	55700	57300
lead	7439-92-1	E440	0.50	mg/kg	836	670	714	450	537
lithium	7439-93-2	E440	2.0	mg/kg	23.9	26.8	31.1	25.8	26.5
magnesium	7439-95-4	E440	20	mg/kg	12300	13200	12000	12500	12400
manganese	7439-96-5	E440	1.0	mg/kg	832	931	1020	1030	934
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.133	0.0586	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	33.3	32.2	30.4	30.3	32.1
nickel	7440-02-0	E440	0.50	mg/kg	259	198	213	235	212
phosphorus	7723-14-0	E440	50	mg/kg	14300	15900	17600	14800	14800
potassium	7440-09-7	E440	100	mg/kg	5610	5670	5910	5790	5840
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.51	0.42	0.49	0.46
silver	7440-22-4	E440	0.10	mg/kg	6.18	13.3	8.14	6.45	11.8
sodium	7440-23-5	E440	50	mg/kg	16600	16400	17800	16600	16900
strontium	7440-24-6	E440	0.50	mg/kg	347	354	343	473	334



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2246-A-1	BA2246-A-2	BA2246-A-3	BA2246-A-4	BA2246-A-5
Client sampling date / time					16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-001	VA22C8349-002	VA22C8349-003	VA22C8349-004	VA22C8349-005
					Result	Result	Result	Result	Result
Metals									
sulfur	7704-34-9	E440	1000	mg/kg	13800	15100	15400	13500	13900
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg	105	124	130	467	150
titanium	7440-32-6	E440	1.0	mg/kg	303	353	260	238	468
tungsten	7440-33-7	E440	0.50	mg/kg	18.6	24.4	24.6	16.6	24.5
uranium	7440-61-1	E440	0.050	mg/kg	2.42	2.68	2.70	2.54	2.69
vanadium	7440-62-2	E440	0.20	mg/kg	35.2	38.0	38.2	34.6	41.0
zinc	7440-66-6	E440	2.0	mg/kg	7120	3840	3620	3680	4670
zirconium	7440-67-7	E440	1.0	mg/kg	3.7	2.2	3.4	2.7	2.7
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.4	11.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.47	9.44	9.62	9.42	9.42
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444	0.010	pH units	6.33	6.27	6.38	6.19	6.29
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	2.00	1.91	2.15	1.80	1.92
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.156	0.086	0.130	0.113	0.085
calcium, TCLP	7440-70-2	E444	10	mg/L	1860	1800	1760	1810	1770
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	0.846	0.837	0.959	1.20
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.588	0.778	0.410	0.438	0.506
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	127	115	125	120	122
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	0.41	0.55	0.46	0.46	0.79
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	BA2246-A-1	BA2246-A-2	BA2246-A-3	BA2246-A-4	BA2246-A-5
					Client sampling date / time	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-001	VA22C8349-002	VA22C8349-003	VA22C8349-004	VA22C8349-005	
					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	26.5	20.3	19.1	24.2	28.2	28.2
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)

					BA2246-A-6	BA2246-A-7	BA2246-A-8	BA2246-A-9	BA2246-A-10
Client sampling date / time					16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-006	VA22C8349-007	VA22C8349-008	VA22C8349-009	VA22C8349-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	21.3	24.5	23.7	23.6	22.5
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.2	10.2	10.2	10.2
Metals									
aluminum	7429-90-5	E440	50	mg/kg	31400	36100	33600	34900	40200
antimony	7440-36-0	E440	0.10	mg/kg	134	132	123	158	140
arsenic	7440-38-2	E440	0.10	mg/kg	29.6	27.5	23.9	48.9	33.8
barium	7440-39-3	E440	0.50	mg/kg	486	623	630	583	517
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.37	0.37	0.36
bismuth	7440-69-9	E440	0.20	mg/kg	7.53	8.23	6.50	6.58	8.33
boron	7440-42-8	E440	5.0	mg/kg	178	200	197	164	257
cadmium	7440-43-9	E440	0.020	mg/kg	9.62	8.72	11.9	8.31	10.6
calcium	7440-70-2	E440	50	mg/kg	153000	138000	136000	147000	145000
chromium	7440-47-3	E440	0.50	mg/kg	203	199	163	177	155
cobalt	7440-48-4	E440	0.10	mg/kg	97.0	92.4	58.9	119	43.6
copper	7440-50-8	E440	0.50	mg/kg	1600	2010	4920	3650	2940
iron	7439-89-6	E440	50	mg/kg	65100	84300	49500	62800	42600
lead	7439-92-1	E440	0.50	mg/kg	1010	454	540	1920	520
lithium	7439-93-2	E440	2.0	mg/kg	27.0	24.6	28.8	25.3	26.5
magnesium	7439-95-4	E440	20	mg/kg	12500	11500	12400	12600	11700
manganese	7439-96-5	E440	1.0	mg/kg	1070	1030	932	898	874
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.0600	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	33.6	27.3	42.7	25.1	28.2
nickel	7440-02-0	E440	0.50	mg/kg	164	159	174	256	124
phosphorus	7723-14-0	E440	50	mg/kg	14400	13400	12800	11300	13200
potassium	7440-09-7	E440	100	mg/kg	5420	5450	5420	5570	5680
selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.43	0.45	0.50	0.42
silver	7440-22-4	E440	0.10	mg/kg	6.81	6.36	6.26	9.50	10.6
sodium	7440-23-5	E440	50	mg/kg	16100	15700	16100	16000	15800
strontium	7440-24-6	E440	0.50	mg/kg	462	314	320	657	324
sulfur	7704-34-9	E440	1000	mg/kg	14000	12200	12500	13600	14000



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2246-A-6	BA2246-A-7	BA2246-A-8	BA2246-A-9	BA2246-A-10
Client sampling date / time					16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-006	VA22C8349-007	VA22C8349-008	VA22C8349-009	VA22C8349-010	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	138	124	108	316	128	
titanium	7440-32-6	E440	1.0	mg/kg	239	450	496	455	436	
tungsten	7440-33-7	E440	0.50	mg/kg	23.6	21.8	19.5	22.4	18.2	
uranium	7440-61-1	E440	0.050	mg/kg	2.62	2.35	2.34	2.50	2.82	
vanadium	7440-62-2	E440	0.20	mg/kg	42.3	39.6	41.0	36.3	38.7	
zinc	7440-66-6	E440	2.0	mg/kg	4860	3780	3600	3550	3880	
zirconium	7440-67-7	E440	1.0	mg/kg	2.8	2.1	1.8	1.7	2.4	
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	9.37	9.56	9.41	9.53	9.61	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.08	6.27	6.26	6.37	6.19	
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	1.94	2.02	2.29	2.43	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.104	0.090	0.201	0.113	0.123	
calcium, TCLP	7440-70-2	E444	10	mg/L	1700	1830	1900	1920	1940	
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	0.903	0.954	1.54	0.823	2.52	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.340	0.603	0.596	0.361	0.832	
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	120	123	126	129	137	
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	0.46	0.48	0.96	0.46	0.45	
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	BA2246-A-6	BA2246-A-7	BA2246-A-8	BA2246-A-9	BA2246-A-10
					Client sampling date / time	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00	16-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-006	VA22C8349-007	VA22C8349-008	VA22C8349-009	VA22C8349-010	
					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	23.3	28.2	19.8	28.6	27.2	
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)

					BA2246-A-11	BA2246-A-12	----	----	----
Client sampling date / time					16-Nov-2022 09:00	16-Nov-2022 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-011	VA22C8349-012	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
moisture	---	E144	0.25	%	22.3	23.2	---	---	---
pH (1:2 soil:water)	---	E108	0.10	pH units	10.3	10.3	---	---	---
Metals									
aluminum	7429-90-5	E440	50	mg/kg	45200	33200	---	---	---
antimony	7440-36-0	E440	0.10	mg/kg	117	99.8	---	---	---
arsenic	7440-38-2	E440	0.10	mg/kg	28.4	27.7	---	---	---
barium	7440-39-3	E440	0.50	mg/kg	584	494	---	---	---
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.38	---	---	---
bismuth	7440-69-9	E440	0.20	mg/kg	6.75	6.28	---	---	---
boron	7440-42-8	E440	5.0	mg/kg	195	183	---	---	---
cadmium	7440-43-9	E440	0.020	mg/kg	8.20	8.20	---	---	---
calcium	7440-70-2	E440	50	mg/kg	144000	136000	---	---	---
chromium	7440-47-3	E440	0.50	mg/kg	1630	207	---	---	---
cobalt	7440-48-4	E440	0.10	mg/kg	72.5	44.8	---	---	---
copper	7440-50-8	E440	0.50	mg/kg	3060	2490	---	---	---
iron	7439-89-6	E440	50	mg/kg	71300	64500	---	---	---
lead	7439-92-1	E440	0.50	mg/kg	448	759	---	---	---
lithium	7439-93-2	E440	2.0	mg/kg	25.1	22.0	---	---	---
magnesium	7439-95-4	E440	20	mg/kg	11600	11500	---	---	---
manganese	7439-96-5	E440	1.0	mg/kg	1110	967	---	---	---
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	---	---	---
molybdenum	7439-98-7	E440	0.10	mg/kg	31.2	25.9	---	---	---
nickel	7440-02-0	E440	0.50	mg/kg	551	209	---	---	---
phosphorus	7723-14-0	E440	50	mg/kg	13800	13500	---	---	---
potassium	7440-09-7	E440	100	mg/kg	5570	5190	---	---	---
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.40	---	---	---
silver	7440-22-4	E440	0.10	mg/kg	6.04	13.7	---	---	---
sodium	7440-23-5	E440	50	mg/kg	16800	15600	---	---	---
strontium	7440-24-6	E440	0.50	mg/kg	318	307	---	---	---
sulfur	7704-34-9	E440	1000	mg/kg	12100	11200	---	---	---



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2246-A-11	BA2246-A-12	----	----	----
					16-Nov-2022 09:00	16-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-011	VA22C8349-012	-----	-----	-----
					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	118	141	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	486	227	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	20.8	15.6	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	2.40	2.18	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	49.7	37.2	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	3480	3310	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	3.1	3.3	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.51	9.56	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.28	6.21	----	----	----
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	2.01	1.94	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.086	0.273	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	1880	1920	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.33	0.863	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.881	0.700	----	----	----
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	129	128	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.40	0.40	----	----	----
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		BA2246-A-11	BA2246-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		16-Nov-2022 09:00	16-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C8349-011	VA22C8349-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
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	25.5	26.3	----	----	----	----	----
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 : VA22C8349</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 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 : 22-Nov-2022 12:00</p> <p>Issue Date : 30-Nov-2022 08:08</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	VA22C8349-001	BA2246-A-1	boron	7440-42-8	E440	66.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C8349-001	BA2246-A-1	cadmium	7440-43-9	E440	75.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C8349-001	BA2246-A-1	lead	7439-92-1	E440	49.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C8349-001	BA2246-A-1	lithium	7439-93-2	E440	90.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C8349-001	BA2246-A-1	nickel	7440-02-0	E440	41.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C8349-001	BA2246-A-1	zinc	7440-66-6	E440	42.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group 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 BA2246-A-1	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-10	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-11	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-12	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-2	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-3	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2246-A-4	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 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 BA2246-A-5	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2246-A-6	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2246-A-7	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2246-A-8	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2246-A-9	E510	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	28 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2246-A-1	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2246-A-10	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2246-A-11	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2246-A-12	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-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		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-2	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-3	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-4	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-5	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-6	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-7	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-8	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2246-A-9	E440	16-Nov-2022	29-Nov-2022	----	----		30-Nov-2022	180 days	14 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2246-A-1	E144	16-Nov-2022	----	----	----		25-Nov-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 BA2246-A-10	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-11	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-12	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-2	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-3	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-4	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-5	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-6	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2246-A-7	E144	16-Nov-2022	----	----	----		25-Nov-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 BA2246-A-8	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2246-A-9	E144	16-Nov-2022	----	----	----		25-Nov-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-1	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-10	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-11	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-12	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-2	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-3	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-4	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 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 BA2246-A-5	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-6	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-7	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-8	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2246-A-9	E108	16-Nov-2022	29-Nov-2022	----	----		29-Nov-2022	30 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-1	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-10	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-11	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-12	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 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) BA2246-A-2	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-3	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-4	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-5	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-6	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-7	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-8	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2246-A-9	E512	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	28 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-1	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 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) BA2246-A-10	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-11	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-12	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-2	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-3	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-4	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-5	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-6	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2246-A-7	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 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) BA2246-A-8	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2246-A-9	E444	22-Nov-2022	24-Nov-2022	----	----		24-Nov-2022	180 days	8 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-1	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-10	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-11	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-12	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-2	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-3	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-4	EPP444	16-Nov-2022	22-Nov-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) BA2246-A-5	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-6	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-7	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-8	EPP444	16-Nov-2022	22-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2246-A-9	EPP444	16-Nov-2022	22-Nov-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	757874	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	757875	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	757877	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	757876	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	757874	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	757875	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	757877	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	757876	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	756412	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	757874	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	756413	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	757875	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	757877	1	13	7.6	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	756412	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	756413	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 : VA22C8349
 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	: VA22C8349	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	: 22-Nov-2022 12:00
PO	: VANCO 0000051213	Date Analysis Commenced	: 22-Nov-2022
C-O-C number	: ----	Issue Date	: 30-Nov-2022 08:08
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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia
Qammar Almas	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: 757876)											
VA22C8349-001	BA2246-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.2	0.1%	5%	----
Physical Tests (QC Lot: 757877)											
VA22C8349-001	BA2246-A-1	moisture	----	E144	0.25	%	23.7	24.0	1.19%	20%	----
Metals (QC Lot: 757874)											
VA22C8349-001	BA2246-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0846	0.0346	Diff <2x LOR	----
Metals (QC Lot: 757875)											
VA22C8349-001	BA2246-A-1	aluminum	7429-90-5	E440	50	mg/kg	37700	37600	0.174%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	140	131	6.91%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	31.5	31.4	0.404%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	527	550	4.14%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.44	0.08	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.51	7.16	4.79%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	188	374	66.3%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	9.29	20.5	75.3%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	148000	156000	5.32%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	191	182	5.27%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	62.8	67.2	6.79%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	1620	2170	28.6%	30%	----
		iron	7439-89-6	E440	50	mg/kg	59300	44300	29.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	836	507	49.0%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	23.9	63.6	90.9%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	12300	12700	2.77%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	832	836	0.474%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	33.3	31.3	6.13%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	259	169	41.9%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	14300	16000	11.5%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5610	6280	11.4%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.50	0.07	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.18	6.40	3.49%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16600	18500	11.2%	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: 757875) - continued											
VA22C8349-001	BA2246-A-1	strontium	7440-24-6	E440	0.50	mg/kg	347	372	7.00%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	13800	15000	8.22%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	105	114	8.22%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	303	355	16.0%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	18.6	20.4	9.22%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	2.42	2.72	12.0%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	35.2	38.0	7.37%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	7120	4610	42.8%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	3.7	2.8	0.9	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: 757877)						
moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 757874)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 757875)						
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: 757875) - 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: 756412)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 756413)						
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: 757876)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 757877)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 757874)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	109	80.0	120	----
Metals (QCLot: 757875)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.5	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.5	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.2	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.9	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	110	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.4	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.5	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	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	101	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	93.9	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.4	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	91.7	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	105	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: 757875) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	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	91.3	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.8	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.0	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: 756412)										
VA22C8349-001	BA2246-A-1	mercury, TCLP	7439-97-6	E512	0.0008 mg/L	0.001 mg/L	80.9	50.0	140	----
TCLP Metals (QCLot: 756413)										
VA22C8349-001	BA2246-A-1	antimony, TCLP	7440-36-0	E444	4.08 mg/L	5 mg/L	81.6	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	93.9	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.0 mg/L	12.5 mg/L	87.7	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.228 mg/L	0.25 mg/L	91.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	7.91 mg/L	10 mg/L	79.1	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.208 mg/L	0.25 mg/L	83.2	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.10 mg/L	1.25 mg/L	87.6	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	2.11 mg/L	2.5 mg/L	84.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	214 mg/L	250 mg/L	85.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	7.56 mg/L	10 mg/L	75.6	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	85.5	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.67 mg/L	5 mg/L	93.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.104 mg/L	0.1 mg/L	104	50.0	140	----
		thallium, TCLP	7440-28-0	E444	3.8 mg/L	5 mg/L	76.7	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.07 mg/L	5 mg/L	81.4	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.67 mg/L	0.75 mg/L	89.8	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	80.4	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix:

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: 757874)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	108	70.0	130	----
Metals (QCLot: 757875)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	95.6	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	100	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	107	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	109	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	99.4	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	109	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	107	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	106	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	107	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	104	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	96.9	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	107	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	102	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	101	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	110	70.0	130	----

Page : 11 of 11
 Work Order : VA22C8349
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

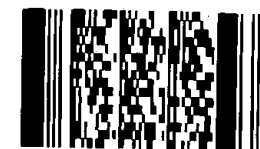
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 757875) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	95.0	70.0	130	----
	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	102	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	94.9	70.0	130	----



Chain of Custody / Analytical Request Form
 Canada Toll Free: 1 800 668 9878
 www.alsglobal.com

COC #

Environmental Division
 Vancouver
 Work Order Reference
VA22C8349



Telephone : +1 604 263 4188

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis)			
Company: Covanta Energy				<input type="checkbox"/> Standard <input type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to C			
Contact: Steve McKinney / Dan Skrypyk				Email 1: smckinney@covanta.com				Analysis Request			
Address: 5150 Riverbend Drive				Email 2: rjohnson4@covanta.com							
Burnaby BC				Email 3: dskrypyk@covanta.com							
Phone: 604-521-1025		Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No		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 #:							
Company:				PO / AFE: PO# 46693 Weekly Bottom Ash - Suite							
Contact:				LSD: (includes 2:1 pH)							
Address:				Quote #:							
Phone: Fax:											

Lab Work Order # (lab use only)		ALS Contact:			Sampler:						Number of Containers
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)			
	BA2246-A-1	16-Nov-22	9:00	Soil	X	X		X			
	BA2246-A-2	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-3	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-4	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-5	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-6	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-7	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-8	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-9	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-10	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-11	16-Nov-22	9:00	Soil	X	X		X			1
	BA2246-A-12	16-Nov-22	9:00	Soil	X	X		X			1

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): 22-Nov-22	Time (hh:mm): 0800	Received by: JC	Date: 22/11/22	Time: 12pm	Temperature: 19 °C	Verified by:	Date:	Time:	Observations: Yes / No ?	
										If Yes add SIF	