

Bottom Ash Data

2022 Week 8

The following analytical report represents bottom ash composite results for week 8 of 2022 (February 20, 2022 to February 26, 2022).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA22A4113**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000051213
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 11
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 01-Mar-2022 10:50
Date Analysis Commenced : 08-Mar-2022
Issue Date : 14-Mar-2022 14:38

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>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, 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)

					BA2208-A-1	BA2208-A-2	BA2208-A-3	BA2208-A-4	BA2208-A-5
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-001	VA22A4113-002	VA22A4113-003	VA22A4113-004	VA22A4113-005
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	23.5	24.7	23.0	21.1	23.0
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.2	11.1	11.1	11.0
Metals									
aluminum	7429-90-5	E440	50	mg/kg	42000	38000	60600	46700	41200
antimony	7440-36-0	E440	0.10	mg/kg	140	140	122	173	155
arsenic	7440-38-2	E440	0.10	mg/kg	19.4	19.8	17.6	24.1	22.5
barium	7440-39-3	E440	0.50	mg/kg	472	581	561	582	708
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.39	0.39	0.46	0.47
bismuth	7440-69-9	E440	0.20	mg/kg	6.95	7.58	7.78	10.0	7.15
boron	7440-42-8	E440	5.0	mg/kg	226	186	220	238	160
cadmium	7440-43-9	E440	0.020	mg/kg	9.93	9.77	9.83	13.3	11.3
calcium	7440-70-2	E440	50	mg/kg	153000	142000	146000	162000	166000
chromium	7440-47-3	E440	0.50	mg/kg	126	163	121	172	246
cobalt	7440-48-4	E440	0.10	mg/kg	44.7	61.9	860	54.6	83.7
copper	7440-50-8	E440	0.50	mg/kg	1750	4920	15200	3830	1730
iron	7439-89-6	E440	50	mg/kg	55300	66800	38100	64400	57600
lead	7439-92-1	E440	0.50	mg/kg	653	542	494	516	457
lithium	7439-93-2	E440	2.0	mg/kg	25.5	21.7	156	24.8	27.0
magnesium	7439-95-4	E440	20	mg/kg	13400	14400	15200	15800	16500
manganese	7439-96-5	E440	1.0	mg/kg	769	4620	1380	930	1130
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0563	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	55.5	53.8	52.6	80.0	57.4
nickel	7440-02-0	E440	0.50	mg/kg	123	191	1300	128	190
phosphorus	7723-14-0	E440	50	mg/kg	11600	10800	13800	13900	13300
potassium	7440-09-7	E440	100	mg/kg	6000	6070	6230	7540	7010
selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.33	0.27	0.36	0.40
silver	7440-22-4	E440	0.10	mg/kg	5.18	8.03	4.73	7.19	8.52
sodium	7440-23-5	E440	50	mg/kg	19700	19400	18900	22300	23500
strontium	7440-24-6	E440	0.50	mg/kg	363	326	314	375	370
sulfur	7704-34-9	E440	1000	mg/kg	14600	12700	13600	16400	15300



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2208-A-1	BA2208-A-2	BA2208-A-3	BA2208-A-4	BA2208-A-5
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-001	VA22A4113-002	VA22A4113-003	VA22A4113-004	VA22A4113-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	0.054	0.053	0.051	
tin	7440-31-5	E440	2.0	mg/kg	114	438	112	165	119	
titanium	7440-32-6	E440	1.0	mg/kg	573	531	632	420	485	
tungsten	7440-33-7	E440	0.50	mg/kg	10.7	10.4	9.24	12.1	9.24	
uranium	7440-61-1	E440	0.050	mg/kg	4.93	4.28	4.49	5.11	5.29	
vanadium	7440-62-2	E440	0.20	mg/kg	44.2	46.0	45.4	52.9	48.9	
zinc	7440-66-6	E440	2.0	mg/kg	4360	5180	3620	5350	5690	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.5	3.5	2.5	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.6	11.8	11.7	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.02	8.66	9.28	9.56	9.20	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.76	6.70	6.87	6.73	6.53	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
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	1.85	1.94	2.02	1.87	1.91	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.154	0.139	0.106	0.117	0.124	
calcium, TCLP	7440-70-2	E444	10	mg/L	2310	2380	2400	2250	2240	
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	0.838	1.19	0.792	0.814	3.28	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.813	0.817	0.656	0.569	0.958	
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	142	144	142	137	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	0.51	0.58	0.49	1.45	0.47	
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	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2208-A-1	BA2208-A-2	BA2208-A-3	BA2208-A-4	BA2208-A-5
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-001	VA22A4113-002	VA22A4113-003	VA22A4113-004	VA22A4113-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
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	27.5	17.6	16.5	22.5	33.4	
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)

					BA2208-A-6	BA2208-A-7	BA2208-A-8	BA2208-A-9	BA2208-A-10
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-006	VA22A4113-007	VA22A4113-008	VA22A4113-009	VA22A4113-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	23.4	22.7	24.1	22.0	23.2
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.2	11.2	11.0	11.1
Metals									
aluminum	7429-90-5	E440	50	mg/kg	48800	39400	38400	45000	52300
antimony	7440-36-0	E440	0.10	mg/kg	141	157	119	201	144
arsenic	7440-38-2	E440	0.10	mg/kg	19.8	18.9	21.4	25.5	20.2
barium	7440-39-3	E440	0.50	mg/kg	594	728	572	569	619
beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.40	0.45	0.49	0.43
bismuth	7440-69-9	E440	0.20	mg/kg	8.09	6.63	96.6	14.6	7.17
boron	7440-42-8	E440	5.0	mg/kg	211	349	226	320	166
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	12.0	8.46	11.7	11.1
calcium	7440-70-2	E440	50	mg/kg	162000	166000	158000	167000	160000
chromium	7440-47-3	E440	0.50	mg/kg	170	349	215	165	164
cobalt	7440-48-4	E440	0.10	mg/kg	62.4	324	36.4	213	78.7
copper	7440-50-8	E440	0.50	mg/kg	3770	3680	3510	3610	1720
iron	7439-89-6	E440	50	mg/kg	68900	65000	64100	60300	51000
lead	7439-92-1	E440	0.50	mg/kg	403	760	667	1790	397
lithium	7439-93-2	E440	2.0	mg/kg	27.2	150	26.0	27.6	22.7
magnesium	7439-95-4	E440	20	mg/kg	17100	15300	14900	15200	17200
manganese	7439-96-5	E440	1.0	mg/kg	1060	989	861	1040	891
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	79.9	54.6	40.2	54.8	188
nickel	7440-02-0	E440	0.50	mg/kg	150	163	123	150	332
phosphorus	7723-14-0	E440	50	mg/kg	13300	14100	13000	13100	14000
potassium	7440-09-7	E440	100	mg/kg	6510	6660	6550	6370	5660
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.31	0.32	0.37	0.33
silver	7440-22-4	E440	0.10	mg/kg	6.86	5.67	4.93	9.89	10.0
sodium	7440-23-5	E440	50	mg/kg	20800	21400	21300	21900	19300
strontium	7440-24-6	E440	0.50	mg/kg	368	1440	291	384	345
sulfur	7704-34-9	E440	1000	mg/kg	15200	14500	14200	15200	14200
thallium	7440-28-0	E440	0.050	mg/kg	0.050	<0.050	<0.050	<0.050	0.108



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2208-A-6	BA2208-A-7	BA2208-A-8	BA2208-A-9	BA2208-A-10
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-006	VA22A4113-007	VA22A4113-008	VA22A4113-009	VA22A4113-010
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E440	2.0	mg/kg	111	163	97.0	236	162
titanium	7440-32-6	E440	1.0	mg/kg	485	472	377	392	627
tungsten	7440-33-7	E440	0.50	mg/kg	17.6	13.5	7.76	8.68	13.2
uranium	7440-61-1	E440	0.050	mg/kg	4.93	4.73	4.99	5.23	4.49
vanadium	7440-62-2	E440	0.20	mg/kg	46.7	50.2	47.4	48.4	50.6
zinc	7440-66-6	E440	2.0	mg/kg	7010	5230	4810	10400	10100
zirconium	7440-67-7	E440	1.0	mg/kg	2.1	1.6	1.5	2.3	2.3
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	11.6	11.7	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.02	9.18	8.71	9.14	9.89
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units	6.61	6.53	6.46	6.60	6.55
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
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	2.10	1.86	2.05	1.97	1.85
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.119	0.126	0.153	0.110	0.114
calcium, TCLP	7440-70-2	E444	10	mg/L	2410	2180	2500	2300	2300
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	0.670	1.05	0.802	1.06	0.656
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.803	0.403	1.00	0.642	0.751
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	144	143	153	144	138
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	0.39	0.42	0.47	0.55	0.49
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
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<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



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2208-A-6	BA2208-A-7	BA2208-A-8	BA2208-A-9	BA2208-A-10
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00	23-Feb-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-006	VA22A4113-007	VA22A4113-008	VA22A4113-009	VA22A4113-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
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	20.0	21.8	27.4	18.8	20.5	
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	BA2208-A-11	BA2208-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	23-Feb-2022 09:00	23-Feb-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-011	VA22A4113-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	23.3	22.3	---	---	---	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.1	---	---	---	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	58800	42400	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	132	160	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	19.9	20.9	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	538	494	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.51	0.44	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	6.79	8.54	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	278	387	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	10.3	11.4	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	152000	136000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	214	209	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	35.9	48.9	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	1890	2280	---	---	---	
iron	7439-89-6	E440	50	mg/kg	67600	54800	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	455	374	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	23.1	29.4	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	13800	13300	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	1050	942	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	55.9	58.7	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	147	267	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	12200	11600	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	6470	6240	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.32	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	4.22	4.86	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	20300	19100	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	380	357	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	13600	13800	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2208-A-11	BA2208-A-12	----	----	----
					23-Feb-2022 09:00	23-Feb-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-011	VA22A4113-012	-----	-----	-----
					Result	Result	---	---	---
Metals									
tin	7440-31-5	E440	2.0	mg/kg	139	132	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	736	326	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	7.78	6.81	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	4.65	4.78	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	51.2	45.9	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	5860	4500	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	2.7	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.88	9.19	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.64	6.58	----	----	----
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----
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	1.91	1.87	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.226	0.116	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	2430	2290	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.833	0.849	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.529	0.812	----	----	----
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	142	142	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.42	0.50	----	----	----
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	----	----	----
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	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2208-A-11	BA2208-A-12	----	----	----
Client sampling date / time					23-Feb-2022 09:00	23-Feb-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22A4113-011	VA22A4113-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	31.2	20.5	----	----	----	
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

Work Order	: VA22A4113	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 01-Mar-2022 10:50
PO	: VANCO 0000051213	Issue Date	: 14-Mar-2022 14:38
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services 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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) 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	VA22A4113-001	BA2208-A-1	bismuth	7440-69-9	E440	68.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A4113-001	BA2208-A-1	cadmium	7440-43-9	E440	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A4113-001	BA2208-A-1	cobalt	7440-48-4	E440	37.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A4113-001	BA2208-A-1	nickel	7440-02-0	E440	71.3 % 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.

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-4294410 02	----	antimony	7440-36-0	E440	121 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



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 BA2208-A-1	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-10	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-11	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-12	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-2	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-3	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-4	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✓	11-Mar-2022	12 days	0 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 BA2208-A-5	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✔	11-Mar-2022	12 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-6	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✔	11-Mar-2022	12 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-7	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✔	11-Mar-2022	12 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-8	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✔	11-Mar-2022	12 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2208-A-9	E510	23-Feb-2022	11-Mar-2022	28 days	16 days	✔	11-Mar-2022	12 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2208-A-1	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2208-A-10	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2208-A-11	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2208-A-12	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 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 ICPCS											
LDPE bag BA2208-A-2	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-3	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-4	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-5	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-6	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-7	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-8	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2208-A-9	E440	23-Feb-2022	11-Mar-2022	180 days	16 days	✔	11-Mar-2022	164 days	1 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2208-A-1	E144	23-Feb-2022	----	----	----		10-Mar-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 BA2208-A-10	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-11	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-12	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-2	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-3	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-4	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-5	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-6	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2208-A-7	E144	23-Feb-2022	----	----	----		10-Mar-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 BA2208-A-8	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2208-A-9	E144	23-Feb-2022	----	----	----		10-Mar-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-1	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-10	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-11	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-12	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-2	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-3	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-4	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 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 BA2208-A-5	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-6	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-7	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-8	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2208-A-9	E108	23-Feb-2022	11-Mar-2022	30 days	16 days	✔	11-Mar-2022	14 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-1	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-10	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-11	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-12	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-2	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-3	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-4	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-5	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-6	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-7	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-8	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2208-A-9	E512	08-Mar-2022	----	----	----		10-Mar-2022	41 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-1	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-10	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-11	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-12	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-2	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-3	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-4	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-5	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-6	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2208-A-7	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2208-A-8	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2208-A-9	E444	08-Mar-2022	----	----	----		10-Mar-2022	193 days	15 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-1	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-10	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-11	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-12	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-2	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-3	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-4	EPP444	23-Feb-2022	08-Mar-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: 28 day HT (e.g. Hg, CrVI) BA2208-A-5	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-6	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-7	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-8	EPP444	23-Feb-2022	08-Mar-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2208-A-9	EPP444	23-Feb-2022	08-Mar-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 (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	429442	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	429441	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	429444	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	429443	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	429442	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	429441	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	429444	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	429443	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	428652	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	429442	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	428653	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	429441	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	429444	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	428652	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	428653	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, 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. Elemental Sulfur may be poorly recovered by this method. 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.
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.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 : VA22A4113

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000051213
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 01-Mar-2022 10:50
Date Analysis Commenced : 08-Mar-2022
Issue Date : 14-Mar-2022 14:38

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 Percentage Difference (RPD) and Acceptance Limits
● Matrix Spike (MS) Report; Recovery and Acceptance Limits
● Reference Material (RM) Report; Recovery and Acceptance Limits
● Method Blank (MB) Report; Recovery and Acceptance Limits
● Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Dee Lee (Analyst, Metals), Kevin Duarte (Supervisor - Metals ICP Instrumentation, Metals), Kim Jensen (Department Manager - Metals, Metals), and Ophelia Chiu (Department Manager - Organics, Organics).

Page : 2 of 11
Work Order : VA22A4113
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



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 Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage 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: 429443)											
VA22A4113-001	BA2208-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.0	0.3%	5%	----
Physical Tests (QC Lot: 429444)											
VA22A4113-001	BA2208-A-1	moisture	----	E144	0.25	%	23.5	22.6	4.01%	20%	----
Metals (QC Lot: 429441)											
VA22A4113-001	BA2208-A-1	aluminum	7429-90-5	E440	50	mg/kg	42000	42700	1.68%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	140	141	0.654%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	19.4	19.0	2.33%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	472	493	4.34%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.45	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	6.95	14.2	68.9%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	226	207	8.63%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.93	14.2	35.7%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	153000	153000	0.0496%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	126	162	25.0%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	44.7	30.5	37.6%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1750	1770	1.20%	30%	----
		iron	7439-89-6	E440	50	mg/kg	55300	43600	23.6%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	653	495	27.5%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	25.5	22.0	14.7%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	13400	13200	1.63%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	769	890	14.6%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	55.5	77.8	33.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	123	260	71.3%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11600	12000	3.80%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6000	6200	3.27%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.40	0.09	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.18	5.45	5.10%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	19700	19300	1.76%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	363	349	4.00%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	14600	14800	1.71%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	0.001	Diff <2x LOR	----



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: 429441) - continued											
VA22A4113-001	BA2208-A-1	tin	7440-31-5	E440	2.0	mg/kg	114	115	0.758%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	573	558	2.55%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	10.7	9.10	15.9%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.93	4.97	0.799%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	44.2	47.1	6.37%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4360	4200	3.70%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	2.2	0.5	Diff <2x LOR	----
Metals (QC Lot: 429442)											
VA22A4113-001	BA2208-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 429444)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 429441)						
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	----
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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 429441) - continued						
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: 429442)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 428652)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 428653)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 429443)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 429444)									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
Metals (QCLot: 429441)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	# 121	80.0	120	MES
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	113	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	106	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	110	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.6	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	104	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.5	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	99.4	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	91.9	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	115	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	111	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.2	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	112	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	112	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	100	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	111	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	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: 429441) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	106	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.0	80.0	120	----
Metals (QCLot: 429442)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	115	80.0	120	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



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: 428652)										
VA22A4113-001	BA2208-A-1	mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	110	50.0	140	----
TCLP Metals (QCLot: 428653)										
VA22A4113-001	BA2208-A-1	antimony, TCLP	7440-36-0	E444	5.8 mg/L	5 mg/L	117	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	98.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.6 mg/L	12.5 mg/L	116	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.238 mg/L	0.25 mg/L	95.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.10 mg/L	10 mg/L	91.0	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.255 mg/L	0.25 mg/L	102	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	1.19 mg/L	1.25 mg/L	95.1	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	2.32 mg/L	2.5 mg/L	93.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	238 mg/L	250 mg/L	95.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	11.7 mg/L	10 mg/L	117	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	308 mg/L	250 mg/L	123	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.39 mg/L	2.5 mg/L	95.8	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.92 mg/L	5 mg/L	98.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.105 mg/L	0.1 mg/L	105	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.7 mg/L	5 mg/L	115	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.79 mg/L	5 mg/L	116	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	98.5	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	10 mg/L	10 mg/L	102	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: **Soil/Solid**

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: 429441)									
QC-429441-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
QC-429441-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	105	70.0	130	----
QC-429441-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	108	70.0	130	----
QC-429441-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	116	70.0	130	----
QC-429441-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
QC-429441-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	----
QC-429441-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-429441-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	112	70.0	130	----
QC-429441-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
QC-429441-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	107	70.0	130	----
QC-429441-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	110	70.0	130	----
QC-429441-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
QC-429441-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	119	70.0	130	----
QC-429441-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	113	70.0	130	----
QC-429441-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	117	70.0	130	----
QC-429441-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
QC-429441-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	112	70.0	130	----
QC-429441-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	112	70.0	130	----
QC-429441-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	117	70.0	130	----
QC-429441-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	106	70.0	130	----
QC-429441-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	----
QC-429441-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	117	70.0	130	----
QC-429441-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	113	40.0	160	----
QC-429441-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	101	70.0	130	----
QC-429441-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
QC-429441-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	112	70.0	130	----
QC-429441-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	112	70.0	130	----
QC-429441-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	110	70.0	130	----
QC-429441-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	99.9	70.0	130	----

Page : 11 of 11
 Work Order : VA22A4113
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

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: 429442)									
QC-429442-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	124	70.0	130	----



Chain of Custody / Analytical Request Form

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COC # _____

Page ____ of ____

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 #:		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:		Lab/Work Order # (lab use only) 4113		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
BA2208-A-1		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-2		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-3		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-4		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-5		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-6		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-7		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-8		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-9		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-10		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-11		23-Feb-22	9:00	Soil	X	X		X				1
BA2208-A-12		23-Feb-22	9:00	Soil	X	X		X				1

Environmental Division
Vancouver
Work Order Reference
VA22A4113

Telephone : +1 604 263 4188

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	1-MAR-22	<i>[Signature]</i>	<i>[Signature]</i>	MARCH 1/22	10:50	20°C				