

Bottom Ash Data

2022 Week 38

The following analytical report represents bottom ash composite results for week 38 of 2022 (September 18, 2022 to September 24, 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 : **VA22C3272**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Nicole Victor
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : ----
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 : 27-Sep-2022 13:00
Date Analysis Commenced : 28-Sep-2022
Issue Date : 06-Oct-2022 17:09

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>
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - 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					Client sample ID	BA2238-A-1	BA2238-A-2	BA2238-A-3	BA2238-A-4	BA2238-A-5
(Matrix: Soil/Solid)					Client sampling date / time	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-001	VA22C3272-002	VA22C3272-003	VA22C3272-004	VA22C3272-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.4	19.4	20.8	22.3	21.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.6	10.7	10.7	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	39200	30000	31800	27000	33700	
antimony	7440-36-0	E440	0.10	mg/kg	107	100	104	108	91.1	
arsenic	7440-38-2	E440	0.10	mg/kg	21.2	18.2	28.9	20.4	24.7	
barium	7440-39-3	E440	0.50	mg/kg	430	458	438	318	340	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.36	0.38	0.38	0.30	
bismuth	7440-69-9	E440	0.20	mg/kg	10.1	5.67	8.76	8.10	60.3	
boron	7440-42-8	E440	5.0	mg/kg	154	181	126	230	148	
cadmium	7440-43-9	E440	0.020	mg/kg	12.6	10.9	12.3	16.2	11.1	
calcium	7440-70-2	E440	50	mg/kg	128000	126000	124000	133000	119000	
chromium	7440-47-3	E440	0.50	mg/kg	185	1550	180	494	148	
cobalt	7440-48-4	E440	0.10	mg/kg	34.2	101	381	101	65.7	
copper	7440-50-8	E440	0.50	mg/kg	2520	1670	1270	3150	1500	
iron	7439-89-6	E440	50	mg/kg	59800	75700	46600	57200	65800	
lead	7439-92-1	E440	0.50	mg/kg	352	306	1160	2160	377	
lithium	7439-93-2	E440	2.0	mg/kg	42.8	24.3	41.8	32.0	27.2	
magnesium	7439-95-4	E440	20	mg/kg	10800	10600	11100	10800	9940	
manganese	7439-96-5	E440	1.0	mg/kg	1470	825	905	863	1010	
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	24.7	54.2	22.8	37.1	38.9	
nickel	7440-02-0	E440	0.50	mg/kg	148	790	246	298	184	
phosphorus	7723-14-0	E440	50	mg/kg	13100	12800	14000	12800	12500	
potassium	7440-09-7	E440	100	mg/kg	4900	5030	6130	5020	4850	
selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.37	0.33	0.45	0.90	
silver	7440-22-4	E440	0.10	mg/kg	4.13	4.38	6.53	8.14	7.90	
sodium	7440-23-5	E440	50	mg/kg	14200	15500	16200	14100	13900	
strontium	7440-24-6	E440	0.50	mg/kg	301	478	299	292	260	
sulfur	7704-34-9	E440	1000	mg/kg	11700	10600	12300	12400	12500	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2238-A-1	BA2238-A-2	BA2238-A-3	BA2238-A-4	BA2238-A-5
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-001	VA22C3272-002	VA22C3272-003	VA22C3272-004	VA22C3272-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.091	0.068	0.090	0.073	0.067	
tin	7440-31-5	E440	2.0	mg/kg	96.9	102	304	109	81.3	
titanium	7440-32-6	E440	1.0	mg/kg	239	198	188	167	223	
tungsten	7440-33-7	E440	0.50	mg/kg	12.8	15.6	12.0	12.3	11.6	
uranium	7440-61-1	E440	0.050	mg/kg	6.38	6.48	7.48	7.12	6.00	
vanadium	7440-62-2	E440	0.20	mg/kg	62.0	62.9	70.2	65.8	181	
zinc	7440-66-6	E440	2.0	mg/kg	4170	2840	3780	4580	3320	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.7	1.6	1.5	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.4	11.4	11.5	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.01	8.70	9.30	9.37	9.39	
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	6.05	6.00	5.89	6.09	6.02	
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	1.76	1.94	1.85	1.76	1.73	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.144	0.155	0.160	2.05	0.148	
calcium, TCLP	7440-70-2	E444	10	mg/L	1840	1840	1850	1830	1860	
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	1.37	3.56	2.22	6.10	1.55	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.941	0.596	0.965	0.785	1.11	
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	125	131	129	132	132	
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	0.82	0.65	0.69	1.21	1.01	
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 (Matrix: Soil/Solid)					Client sample ID	BA2238-A-1	BA2238-A-2	BA2238-A-3	BA2238-A-4	BA2238-A-5
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-001	VA22C3272-002	VA22C3272-003	VA22C3272-004	VA22C3272-005	
					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	31.5	46.2	35.0	33.4	25.4	25.4
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 (Matrix: Soil/Solid)					Client sample ID	BA2238-A-6	BA2238-A-7	BA2238-A-8	BA2238-A-9	BA2238-A-10
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-006	VA22C3272-007	VA22C3272-008	VA22C3272-009	VA22C3272-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	21.6	21.6	21.4	21.6	21.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	10.7	10.7	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31000	29600	42200	42600	29700	
antimony	7440-36-0	E440	0.10	mg/kg	119	131	103	83.4	92.6	
arsenic	7440-38-2	E440	0.10	mg/kg	23.6	28.6	18.7	18.6	22.3	
barium	7440-39-3	E440	0.50	mg/kg	317	341	406	523	480	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.39	0.45	0.41	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	9.87	9.47	6.49	5.11	6.32	
boron	7440-42-8	E440	5.0	mg/kg	202	233	250	279	207	
cadmium	7440-43-9	E440	0.020	mg/kg	15.5	15.1	12.3	9.53	12.5	
calcium	7440-70-2	E440	50	mg/kg	142000	147000	138000	122000	131000	
chromium	7440-47-3	E440	0.50	mg/kg	163	187	477	133	2400	
cobalt	7440-48-4	E440	0.10	mg/kg	84.5	163	49.6	35.1	102	
copper	7440-50-8	E440	0.50	mg/kg	2300	3580	2960	1750	1340	
iron	7439-89-6	E440	50	mg/kg	53600	65200	55900	40600	57100	
lead	7439-92-1	E440	0.50	mg/kg	658	551	395	370	308	
lithium	7439-93-2	E440	2.0	mg/kg	29.7	38.4	27.3	23.3	22.0	
magnesium	7439-95-4	E440	20	mg/kg	11500	11600	11400	10600	11400	
manganese	7439-96-5	E440	1.0	mg/kg	740	844	803	886	722	
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	29.6	31.4	23.9	147	58.5	
nickel	7440-02-0	E440	0.50	mg/kg	191	325	628	128	1380	
phosphorus	7723-14-0	E440	50	mg/kg	14800	15200	13800	13500	14400	
potassium	7440-09-7	E440	100	mg/kg	5680	5870	5250	5380	5280	
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.50	0.40	0.26	0.35	
silver	7440-22-4	E440	0.10	mg/kg	4.93	12.4	4.90	3.21	4.43	
sodium	7440-23-5	E440	50	mg/kg	15600	15900	15400	15400	14800	
strontium	7440-24-6	E440	0.50	mg/kg	363	380	304	288	295	
sulfur	7704-34-9	E440	1000	mg/kg	14900	15300	12900	10100	11400	
thallium	7440-28-0	E440	0.050	mg/kg	0.086	0.090	0.079	0.058	0.072	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2238-A-6	BA2238-A-7	BA2238-A-8	BA2238-A-9	BA2238-A-10
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-006	VA22C3272-007	VA22C3272-008	VA22C3272-009	VA22C3272-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	117	139	107	156	128	
titanium	7440-32-6	E440	1.0	mg/kg	198	219	257	240	202	
tungsten	7440-33-7	E440	0.50	mg/kg	17.4	26.1	11.8	7.42	13.5	
uranium	7440-61-1	E440	0.050	mg/kg	8.16	7.88	6.95	5.26	6.35	
vanadium	7440-62-2	E440	0.20	mg/kg	110	69.7	65.6	54.8	74.0	
zinc	7440-66-6	E440	2.0	mg/kg	4060	4380	3490	3810	3550	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.3	1.9	1.4	1.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	11.5	11.5	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.23	9.35	9.48	9.40	9.39	
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	6.17	6.06	5.97	6.20	6.12	
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	2.17	1.79	1.73	1.79	1.79	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.152	0.227	1.30	0.136	0.128	
calcium, TCLP	7440-70-2	E444	10	mg/L	1880	1860	1850	1890	1880	
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	1.40	2.42	1.62	1.48	1.38	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.884	0.805	0.809	0.935	0.100	
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	136	128	127	133	127	
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	0.60	0.70	0.69	1.73	0.67	
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 (Matrix: Soil/Solid)					Client sample ID	BA2238-A-6	BA2238-A-7	BA2238-A-8	BA2238-A-9	BA2238-A-10
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00	21-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-006	VA22C3272-007	VA22C3272-008	VA22C3272-009	VA22C3272-010	
					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	24.5	51.7	28.0	22.1	52.0	
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					Client sample ID	BA2238-A-11	BA2238-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	21-Sep-2022 09:00	21-Sep-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-011	VA22C3272-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	22.7	20.7	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.6	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	29700	33600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	125	113	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	25.3	23.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	315	275	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.10	6.90	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	182	165	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	15.4	12.9	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	144000	131000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	167	272	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	344	121	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2990	2470	----	----	----	
iron	7439-89-6	E440	50	mg/kg	52700	50200	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	531	908	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	32.0	34.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11400	11200	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	783	900	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	28.2	36.0	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	144	146	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	16100	15600	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5780	5500	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.42	0.41	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	10.5	5.47	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15600	15700	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	319	588	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14500	13000	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.084	0.079	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2238-A-11	BA2238-A-12	----	----	----
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-011	VA22C3272-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	152	105	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	202	208	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	17.4	15.3	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	7.64	7.17	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	65.8	83.4	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4050	4560	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	2.0	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.30	9.50	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.19	6.15	----	----	----	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	----	----	----	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.95	1.80	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.138	0.215	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1880	1840	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.30	1.12	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.821	0.839	----	----	----	
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	134	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	0.66	0.64	----	----	----	
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 (Matrix: Soil/Solid)					Client sample ID	BA2238-A-11	BA2238-A-12	----	----	----
Client sampling date / time					21-Sep-2022 09:00	21-Sep-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C3272-011	VA22C3272-012	-----	-----	-----	
					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	20.0	49.8	----	----	----	
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	: VA22C3272	Page	: 1 of 16
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	: 27-Sep-2022 13:00
PO	: VANCO 0000051213	Issue Date	: 06-Oct-2022 17:09
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 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 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	VA22C3272-001	BA2238-A-1	antimony	7440-36-0	E440	36.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C3272-001	BA2238-A-1	copper	7440-50-8	E440	61.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C3272-001	BA2238-A-1	lithium	7439-93-2	E440	64.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C3272-001	BA2238-A-1	tungsten	7440-33-7	E440	35.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C3272-001	BA2238-A-1	vanadium	7440-62-2	E440	131 % 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-MRG2-6784720 02	----	boron	7440-42-8	E440	79.5 % MES	80.0-120%	Recovery less than lower 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 BA2238-A-1	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-10	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-11	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-12	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-2	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-3	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-4	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-5	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-6	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-7	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-8	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2238-A-9	E510	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2238-A-1	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2238-A-10	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2238-A-11	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2238-A-12	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-2	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-3	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-4	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-5	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-6	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-7	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-8	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2238-A-9	E440	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	180 days	15 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2238-A-1	E144	21-Sep-2022	----	----	----		03-Oct-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 BA2238-A-10	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-11	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-12	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-2	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-3	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-4	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-5	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-6	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-7	E144	21-Sep-2022	----	----	----		03-Oct-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 BA2238-A-8	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2238-A-9	E144	21-Sep-2022	----	----	----		03-Oct-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-1	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-10	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-11	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-12	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-2	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-3	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2238-A-4	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2238-A-5	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2238-A-6	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2238-A-7	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2238-A-8	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2238-A-9	E108	21-Sep-2022	05-Oct-2022	----	----		05-Oct-2022	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-1	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-10	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-11	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-12	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 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) BA2238-A-2	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-3	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-4	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-5	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-6	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-7	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-8	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2238-A-9	E512	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	28 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-1	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 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) BA2238-A-10	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-11	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-12	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-2	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-3	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-4	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-5	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-6	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-7	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 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) BA2238-A-8	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2238-A-9	E444	28-Sep-2022	03-Oct-2022	----	----		03-Oct-2022	180 days	12 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-1	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-10	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-11	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-12	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-2	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-3	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-4	EPP444	21-Sep-2022	28-Sep-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) BA2238-A-5	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-6	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-7	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-8	EPP444	21-Sep-2022	28-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2238-A-9	EPP444	21-Sep-2022	28-Sep-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	678473	1	19	5.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	678472	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	678476	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	678474	1	19	5.2	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	678473	2	19	10.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	678472	2	19	10.5	10.0	✔
Moisture Content by Gravimetry	E144	678476	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	678474	1	19	5.2	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	677705	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	678473	1	19	5.2	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	677706	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	678472	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	678476	1	19	5.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	677705	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	677706	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. 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.
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 : VA22C3272
Client : Covanta Burnaby Renewable Energy, ULC
Contact : Nicole Victor
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : ---
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, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 27-Sep-2022 13:00
Date Analysis Commenced : 28-Sep-2022
Issue Date : 06-Oct-2022 17:09

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.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Kim Jensen (Department Manager - Metals), Ophelia Chiu (Department Manager - Organics), and Gammar Almas (Lab Assistant).

Page : 2 of 11
Work Order : VA22C3272
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 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: 678474)											
VA22C3272-001	BA2238-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.8	1.0%	5%	----
Physical Tests (QC Lot: 678476)											
VA22C3272-001	BA2238-A-1	moisture	----	E144	0.25	%	19.4	21.3	9.06%	20%	----
Metals (QC Lot: 678472)											
VA22C3272-001	BA2238-A-1	aluminum	7429-90-5	E440	50	mg/kg	39200	32500	18.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	107	74.1	36.8%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	21.2	19.6	8.06%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	430	490	13.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.32	0.10	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	10.1	10.3	2.08%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	154	158	2.84%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.6	13.8	8.90%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	128000	110000	15.7%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	185	179	3.31%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	34.2	34.0	0.463%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	2520	1330	61.8%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	59800	56600	5.50%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	352	269	26.8%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	42.8	22.0	64.2%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	10800	9270	15.0%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1470	1130	26.4%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	24.7	20.1	20.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	148	160	8.12%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	13100	10600	21.7%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4900	4430	10.1%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.30	0.01	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.13	3.71	10.8%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14200	14100	0.512%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	301	266	12.5%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11700	9700	18.6%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.091	0.066	0.026	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: 678472) - continued											
VA22C3272-001	BA2238-A-1	tin	7440-31-5	E440	2.0	mg/kg	96.9	80.4	18.6%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	239	193	21.4%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	12.8	18.2	35.2%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	6.38	5.27	19.0%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	62.0	296	131%	30%	DUP-H
		zinc	7440-66-6	E440	2.0	mg/kg	4170	3160	27.3%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.7	0.1	Diff <2x LOR	----
Metals (QC Lot: 678473)											
VA22C3272-001	BA2238-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: 678476)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 678472)						
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: 678472) - 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: 678473)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
TCLP Metals (QCLot: 677705)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 677706)						
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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 678474)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.3	95.0	105	---
Physical Tests (QCLot: 678476)									
moisture	---	E144	0.25	%	50 %	98.2	90.0	110	---
Metals (QCLot: 678472)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	92.4	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	97.4	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	92.8	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	95.3	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.2	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	96.8	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	# 79.5	80.0	120	MES
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	91.6	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.3	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	90.6	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	90.3	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	90.2	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	85.7	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.0	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	93.2	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	91.0	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	88.1	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	89.7	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	88.8	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	95.3	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.9	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	93.5	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	84.2	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	92.2	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	92.9	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	88.4	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.6	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	88.9	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	90.6	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: 678472) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	90.2	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.8	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	92.3	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.3	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	85.7	80.0	120	----
Metals (QCLot: 678473)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	87.0	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: 677705)										
VA22C3272-001	BA2238-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.1	50.0	140	----
TCLP Metals (QCLot: 677706)										
VA22C3272-001	BA2238-A-1	antimony, TCLP	7440-36-0	E444	4.71 mg/L	5 mg/L	94.2	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.2	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.1	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.218 mg/L	0.25 mg/L	87.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.16 mg/L	10 mg/L	81.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.214 mg/L	0.25 mg/L	85.7	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	1.13 mg/L	1.25 mg/L	90.1	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	2.18 mg/L	2.5 mg/L	87.1	50.0	140	----
		iron, TCLP	7439-89-6	E444	221 mg/L	250 mg/L	88.3	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.01 mg/L	10 mg/L	90.1	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	246 mg/L	250 mg/L	98.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.19 mg/L	2.5 mg/L	87.5	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.44 mg/L	5 mg/L	88.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.096 mg/L	0.1 mg/L	96.1	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.7	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.72 mg/L	5 mg/L	94.3	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.8	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	9 mg/L	10 mg/L	87.6	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: 678472)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	97.8	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	90.0	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	91.6	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	96.1	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	91.3	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	105	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	89.8	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	92.3	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	103	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	95.1	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	90.5	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	95.5	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	97.7	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	101	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	93.7	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	97.3	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	93.3	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	92.9	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	84.3	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	105	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	96.6	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	96.2	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	88.7	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	95.1	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	108	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	93.2	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	97.0	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	94.8	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	91.7	70.0	130	----

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 Work Order : VA22C3272
 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: 678473)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.8	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 Skrypyk	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 3:	dskrypyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
	Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No			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 #:													
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:											
3272															

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
BA2238-A-1		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-2		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-3		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-4		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-5		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-6		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-7		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-8		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-9		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-10		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-11		21-Sep-22	9:00	Soil	X	X			X		1
BA2238-A-12		21-Sep-22	9:00	Soil	X	X			X		1

Environmental Division
Vancouver
Work Order Reference
VA22C3272



Telephone: +1 604 253 4188

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
[Signature]	27-Sep-22	0800				22.0 °C	AS	09/29/22	1 PM	