

Bottom Ash Data

2022 Week 36

The following analytical report represents bottom ash composite results for week 36 of 2022 (September 4, 2022 to September 10, 2022).

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



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **VA22C1778**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Dan Skrypnyk
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 : 13-Sep-2022 11:45
Date Analysis Commenced : 15-Sep-2022
Issue Date : 22-Sep-2022 10:03

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>
Benjamin Oke	Lab Assistant	Metals, Burnaby, British Columbia
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: Solid					Client sample ID	BA2236-A-1	BA2236-A-2	BA2236-A-3	BA2236-A-4	BA2236-A-5
(Matrix: Soil/Solid)					Client sampling date / time	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-001	VA22C1778-002	VA22C1778-003	VA22C1778-004	VA22C1778-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	15.6	14.8	15.5	15.4	15.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	10.6	10.7	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	24100	34000	25400	35400	34900	
antimony	7440-36-0	E440	0.10	mg/kg	135	82.4	113	94.8	120	
arsenic	7440-38-2	E440	0.10	mg/kg	35.7	21.5	28.4	25.3	25.7	
barium	7440-39-3	E440	0.50	mg/kg	372	541	403	499	492	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.38	0.43	0.39	0.46	
bismuth	7440-69-9	E440	0.20	mg/kg	9.78	7.35	8.63	7.03	6.69	
boron	7440-42-8	E440	5.0	mg/kg	176	177	230	186	171	
cadmium	7440-43-9	E440	0.020	mg/kg	12.3	7.55	12.5	8.73	8.82	
calcium	7440-70-2	E440	50	mg/kg	144000	124000	140000	129000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	228	214	342	183	169	
cobalt	7440-48-4	E440	0.10	mg/kg	37.3	42.0	36.2	184	35.7	
copper	7440-50-8	E440	0.50	mg/kg	9130	1380	2280	2330	3950	
iron	7439-89-6	E440	50	mg/kg	71600	63400	59100	56800	41200	
lead	7439-92-1	E440	0.50	mg/kg	1300	292	597	564	847	
lithium	7439-93-2	E440	2.0	mg/kg	29.2	22.8	31.3	26.4	22.8	
magnesium	7439-95-4	E440	20	mg/kg	11800	10500	11100	10900	12000	
manganese	7439-96-5	E440	1.0	mg/kg	930	727	1130	1240	829	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.118	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	36.7	33.0	39.6	35.2	26.6	
nickel	7440-02-0	E440	0.50	mg/kg	217	296	233	207	184	
phosphorus	7723-14-0	E440	50	mg/kg	14900	12100	13800	12100	12200	
potassium	7440-09-7	E440	100	mg/kg	5290	4390	4920	4410	5180	
selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.26	0.47	0.34	0.26	
silver	7440-22-4	E440	0.10	mg/kg	5.24	5.87	5.98	3.90	10.1	
sodium	7440-23-5	E440	50	mg/kg	15400	13900	15000	13800	16400	
strontium	7440-24-6	E440	0.50	mg/kg	294	248	293	262	266	
sulfur	7704-34-9	E440	1000	mg/kg	14600	9900	12500	10100	10800	



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-1	BA2236-A-2	BA2236-A-3	BA2236-A-4	BA2236-A-5
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-001	VA22C1778-002	VA22C1778-003	VA22C1778-004	VA22C1778-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.090	0.057	0.064	0.058	0.063	
tin	7440-31-5	E440	2.0	mg/kg	580	85.1	121	125	263	
titanium	7440-32-6	E440	1.0	mg/kg	186	276	202	235	221	
tungsten	7440-33-7	E440	0.50	mg/kg	13.0	10.9	11.1	9.95	7.93	
uranium	7440-61-1	E440	0.050	mg/kg	7.52	5.62	6.42	5.68	7.22	
vanadium	7440-62-2	E440	0.20	mg/kg	71.6	60.3	67.1	58.7	64.7	
zinc	7440-66-6	E440	2.0	mg/kg	4770	5120	4140	3590	3420	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.6	1.7	1.9	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	11.4	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.81	8.53	8.46	8.49	8.76	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.62	6.87	6.46	6.45	6.64	
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	2.28	2.26	2.35	2.15	2.19	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.115	0.215	0.330	0.111	0.088	
calcium, TCLP	7440-70-2	E444	10	mg/L	1970	1960	2010	1890	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	0.748	0.854	1.82	1.30	1.40	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.818	0.711	0.990	0.884	0.668	
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	138	143	137	139	141	
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	0.48	0.37	0.62	0.69	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	



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-1	BA2236-A-2	BA2236-A-3	BA2236-A-4	BA2236-A-5
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-001	VA22C1778-002	VA22C1778-003	VA22C1778-004	VA22C1778-005	
					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	17.4	6.30	37.3	16.0	13.0	13.0
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: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-6	BA2236-A-7	BA2236-A-8	BA2236-A-9	BA2236-A-10
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-006	VA22C1778-007	VA22C1778-008	VA22C1778-009	VA22C1778-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	14.7	15.2	15.1	15.9	15.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	10.8	10.8	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	29000	26300	25600	29000	56700	
antimony	7440-36-0	E440	0.10	mg/kg	102	104	105	79.9	84.7	
arsenic	7440-38-2	E440	0.10	mg/kg	35.6	32.8	28.4	22.5	33.3	
barium	7440-39-3	E440	0.50	mg/kg	537	520	520	502	588	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.35	0.38	0.47	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	12.4	10.5	7.83	6.71	6.56	
boron	7440-42-8	E440	5.0	mg/kg	160	170	195	236	203	
cadmium	7440-43-9	E440	0.020	mg/kg	10.0	9.32	8.61	7.34	8.72	
calcium	7440-70-2	E440	50	mg/kg	124000	137000	118000	124000	126000	
chromium	7440-47-3	E440	0.50	mg/kg	237	203	163	196	160	
cobalt	7440-48-4	E440	0.10	mg/kg	96.2	399	33.1	59.0	195	
copper	7440-50-8	E440	0.50	mg/kg	3370	7840	2320	1320	1780	
iron	7439-89-6	E440	50	mg/kg	78600	52200	50300	70300	57200	
lead	7439-92-1	E440	0.50	mg/kg	405	814	6890	388	663	
lithium	7439-93-2	E440	2.0	mg/kg	31.9	32.0	20.7	22.5	35.4	
magnesium	7439-95-4	E440	20	mg/kg	10100	11100	9090	11000	10600	
manganese	7439-96-5	E440	1.0	mg/kg	834	3730	689	781	862	
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	31.4	30.5	29.6	32.4	28.1	
nickel	7440-02-0	E440	0.50	mg/kg	252	176	233	220	192	
phosphorus	7723-14-0	E440	50	mg/kg	12500	13300	11300	12700	12200	
potassium	7440-09-7	E440	100	mg/kg	4760	4830	4340	4400	4270	
selenium	7782-49-2	E440	0.20	mg/kg	0.42	0.52	0.49	0.31	0.35	
silver	7440-22-4	E440	0.10	mg/kg	4.59	4.70	4.06	3.57	4.38	
sodium	7440-23-5	E440	50	mg/kg	14000	14600	13700	16500	14400	
strontium	7440-24-6	E440	0.50	mg/kg	263	265	274	265	278	
sulfur	7704-34-9	E440	1000	mg/kg	11800	11500	9600	10200	9900	
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.062	0.079	0.054	0.055	



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-6	BA2236-A-7	BA2236-A-8	BA2236-A-9	BA2236-A-10
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-006	VA22C1778-007	VA22C1778-008	VA22C1778-009	VA22C1778-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	100	129	88.3	192	94.1	
titanium	7440-32-6	E440	1.0	mg/kg	251	186	171	177	501	
tungsten	7440-33-7	E440	0.50	mg/kg	9.42	9.51	11.4	14.1	6.92	
uranium	7440-61-1	E440	0.050	mg/kg	6.38	5.94	5.42	5.13	5.93	
vanadium	7440-62-2	E440	0.20	mg/kg	64.7	61.0	55.0	74.2	82.3	
zinc	7440-66-6	E440	2.0	mg/kg	5290	5800	2700	3380	3520	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.2	1.7	2.0	2.8	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	11.4	11.4	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.78	8.54	8.35	8.44	8.64	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.35	6.33	6.45	6.80	6.83	
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	2.25	2.24	2.28	2.21	2.38	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.264	0.151	0.064	0.084	0.080	
calcium, TCLP	7440-70-2	E444	10	mg/L	1900	1840	1940	1960	1980	
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	0.800	0.703	0.806	0.820	0.506	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.772	0.948	0.648	0.675	0.616	
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	141	134	138	136	136	
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	0.76	0.56	0.33	0.45	0.38	
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: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-6	BA2236-A-7	BA2236-A-8	BA2236-A-9	BA2236-A-10
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00	07-Sep-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-006	VA22C1778-007	VA22C1778-008	VA22C1778-009	VA22C1778-010	
					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	21.8	19.4	5.36	10.0	6.59	
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: Solid					Client sample ID		BA2236-A-11	BA2236-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		07-Sep-2022 09:00	07-Sep-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-011	VA22C1778-012	-----	-----	-----		
					Result	Result	---	---	---		
Physical Tests											
moisture	----	E144	0.25	%	14.9	16.0	----	----	----		
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	----	----	----		
Metals											
aluminum	7429-90-5	E440	50	mg/kg	37800	23900	----	----	----		
antimony	7440-36-0	E440	0.10	mg/kg	92.3	109	----	----	----		
arsenic	7440-38-2	E440	0.10	mg/kg	21.9	29.4	----	----	----		
barium	7440-39-3	E440	0.50	mg/kg	485	394	----	----	----		
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.38	----	----	----		
bismuth	7440-69-9	E440	0.20	mg/kg	5.53	12.0	----	----	----		
boron	7440-42-8	E440	5.0	mg/kg	174	192	----	----	----		
cadmium	7440-43-9	E440	0.020	mg/kg	8.27	16.7	----	----	----		
calcium	7440-70-2	E440	50	mg/kg	121000	138000	----	----	----		
chromium	7440-47-3	E440	0.50	mg/kg	196	329	----	----	----		
cobalt	7440-48-4	E440	0.10	mg/kg	44.0	188	----	----	----		
copper	7440-50-8	E440	0.50	mg/kg	1420	6280	----	----	----		
iron	7439-89-6	E440	50	mg/kg	52000	75200	----	----	----		
lead	7439-92-1	E440	0.50	mg/kg	301	516	----	----	----		
lithium	7439-93-2	E440	2.0	mg/kg	34.5	28.6	----	----	----		
magnesium	7439-95-4	E440	20	mg/kg	12200	11400	----	----	----		
manganese	7439-96-5	E440	1.0	mg/kg	700	1080	----	----	----		
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----		
molybdenum	7439-98-7	E440	0.10	mg/kg	30.9	63.7	----	----	----		
nickel	7440-02-0	E440	0.50	mg/kg	160	472	----	----	----		
phosphorus	7723-14-0	E440	50	mg/kg	11700	12800	----	----	----		
potassium	7440-09-7	E440	100	mg/kg	4480	4940	----	----	----		
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.44	----	----	----		
silver	7440-22-4	E440	0.10	mg/kg	3.60	6.14	----	----	----		
sodium	7440-23-5	E440	50	mg/kg	14500	14700	----	----	----		
strontium	7440-24-6	E440	0.50	mg/kg	281	346	----	----	----		
sulfur	7704-34-9	E440	1000	mg/kg	10100	14200	----	----	----		
thallium	7440-28-0	E440	0.050	mg/kg	0.068	0.070	----	----	----		



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-11	BA2236-A-12	----	----	----
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-011	VA22C1778-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	77.6	138	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	340	188	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	7.57	15.8	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	5.89	6.84	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	63.0	68.5	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	3150	4420	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	1.2	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.55	8.19	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.51	6.98	---	---	---	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	---	---	---	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	---	---	---	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	---	---	---	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.35	2.31	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.109	0.053	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	1880	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	2.75	0.535	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.889	0.596	---	---	---	
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	140	130	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.46	0.29	---	---	---	
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: Solid (Matrix: Soil/Solid)					Client sample ID	BA2236-A-11	BA2236-A-12	----	----	----
Client sampling date / time					07-Sep-2022 09:00	07-Sep-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C1778-011	VA22C1778-012	-----	-----	-----	
					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	16.3	3.88	----	----	----	
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	: VA22C1778	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Dan Skrypyk	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	: 13-Sep-2022 11:45
PO	: VANCO 0000051213	Issue Date	: 22-Sep-2022 10:03
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 Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22C1778-001	BA2236-A-1	cobalt	7440-48-4	E440	59.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C1778-001	BA2236-A-1	copper	7440-50-8	E440	127 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C1778-001	BA2236-A-1	lead	7439-92-1	E440	99.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C1778-001	BA2236-A-1	tin	7440-31-5	E440	99.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C1778-001	BA2236-A-1	titanium	7440-32-6	E440	56.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C1778-001	BA2236-A-1	tungsten	7440-33-7	E440	32.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-1	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-10	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-11	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-12	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-2	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-3	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-4	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 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 BA2236-A-5	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-6	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-7	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-8	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2236-A-9	E510	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	28 days	9 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2236-A-1	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2236-A-10	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2236-A-11	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2236-A-12	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✓	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-2	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-3	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-4	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-5	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-6	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-7	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-8	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2236-A-9	E440	07-Sep-2022	16-Sep-2022	----	----		19-Sep-2022	180 days	13 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2236-A-1	E144	07-Sep-2022	----	----	----		15-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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-10	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-11	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-12	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-2	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-3	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-4	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-5	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-6	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2236-A-7	E144	07-Sep-2022	----	----	----		15-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		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2236-A-8	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2236-A-9	E144	07-Sep-2022	----	----	----		15-Sep-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-1	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-10	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-11	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-12	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-2	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-3	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-4	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 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 BA2236-A-5	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-6	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-7	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-8	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2236-A-9	E108	07-Sep-2022	16-Sep-2022	----	----		16-Sep-2022	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-1	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-10	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-11	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-12	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-2	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-3	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-4	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-5	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-6	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-7	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-8	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2236-A-9	E512	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	28 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-1	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-10	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-11	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-12	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-2	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-3	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-4	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-5	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-6	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-7	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-8	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2236-A-9	E444	19-Sep-2022	21-Sep-2022	----	----		21-Sep-2022	180 days	14 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-1	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-10	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-11	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-12	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-2	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-3	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-4	EPP444	07-Sep-2022	19-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) BA2236-A-5	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-6	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-7	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-8	EPP444	07-Sep-2022	19-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2236-A-9	EPP444	07-Sep-2022	19-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	649402	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	649403	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	649405	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	649404	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	649402	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	649403	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	649405	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	649404	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	657794	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	649402	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	657795	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	649403	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	649405	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	657794	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	657795	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	: VA22C1778	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Dan Skrypnyk	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	: 13-Sep-2022 11:45
PO	: VANCO 0000051213	Date Analysis Commenced	: 15-Sep-2022
C-O-C number	: ----	Issue Date	: 22-Sep-2022 10:03
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Benjamin Oke	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

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Work Order : VA22C1778
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: 649404)											
VA22C1778-001	BA2236-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	1.6%	5%	----
Physical Tests (QC Lot: 649405)											
VA22C1778-001	BA2236-A-1	moisture	----	E144	0.25	%	15.6	16.6	6.00%	20%	----
Metals (QC Lot: 649402)											
VA22C1778-001	BA2236-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 649403)											
VA22C1778-001	BA2236-A-1	aluminum	7429-90-5	E440	50	mg/kg	24100	27800	14.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	135	100	29.4%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	35.7	27.9	24.5%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	372	520	33.2%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.39	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	9.78	8.12	18.6%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	176	182	3.34%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.3	9.62	24.4%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	144000	135000	6.52%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	228	198	13.9%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	37.3	68.9	59.5%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	9130	2040	127%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	71600	75800	5.69%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	1300	435	99.8%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	29.2	24.4	17.6%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11800	10500	11.6%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	930	906	2.69%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	36.7	40.6	10.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	217	172	23.3%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	14900	12400	18.5%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5290	4950	6.75%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.35	0.11	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.24	6.68	24.1%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15400	15500	0.622%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	294	274	7.14%	40%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 649403) - continued											
VA22C1778-001	BA2236-A-1	sulfur	7704-34-9	E440	1000	mg/kg	14600	12000	19.7%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.090	0.064	0.025	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	580	196	99.0%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	186	332	56.3%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	13.0	9.39	32.5%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	7.52	5.96	23.1%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	71.6	61.3	15.4%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4770	3780	23.2%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.1	0.07	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: 649405)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 649402)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 649403)						
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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 649403) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 657794)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 657795)						
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: 649404)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 649405)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 649402)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	89.8	80.0	120	----
Metals (QCLot: 649403)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	97.0	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	98.1	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.4	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.1	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	89.1	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.9	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	93.9	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.5	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.0	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	93.4	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.9	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.7	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	94.7	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.8	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.0	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.5	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.4	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	95.4	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.7	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	83.9	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.3	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	88.6	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.8	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 649403) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.3	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	91.2	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	94.8	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	91.4	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.2	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.4	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.6	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Soil/Solid

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
TCLP Metals (QCLot: 657794)										
VA22C1778-001	BA2236-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.4	50.0	140	----
TCLP Metals (QCLot: 657795)										
VA22C1778-001	BA2236-A-1	antimony, TCLP	7440-36-0	E444	4.62 mg/L	5 mg/L	92.5	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	96.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.3	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.237 mg/L	0.25 mg/L	95.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.48 mg/L	10 mg/L	84.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.244 mg/L	0.25 mg/L	97.8	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	1.21 mg/L	1.25 mg/L	96.7	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	2.31 mg/L	2.5 mg/L	92.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	241 mg/L	250 mg/L	96.6	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.66 mg/L	10 mg/L	86.6	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	256 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.31 mg/L	2.5 mg/L	92.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.94 mg/L	5 mg/L	98.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.2 mg/L	5 mg/L	84.4	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.38 mg/L	5 mg/L	87.6	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	99.5	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	8 mg/L	10 mg/L	83.7	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: 649402)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	95.7	70.0	130	---
Metals (QCLot: 649403)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	99.4	70.0	130	---
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	91.8	70.0	130	---
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	102	70.0	130	---
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	96.5	70.0	130	---
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	---
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	---
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	94.3	70.0	130	---
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	96.4	70.0	130	---
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	---
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	96.7	70.0	130	---
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	93.4	70.0	130	---
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	94.9	70.0	130	---
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	100	70.0	130	---
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	---
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	95.8	70.0	130	---
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	103	70.0	130	---
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	96.5	70.0	130	---
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	97.4	70.0	130	---
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	89.7	70.0	130	---
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	107	70.0	130	---
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	---
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	95.9	70.0	130	---
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	98.8	40.0	160	---
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	87.5	70.0	130	---
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	106	70.0	130	---
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	97.8	70.0	130	---
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	101	70.0	130	---

Page : 11 of 11
 Work Order : VA22C1778
 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: 649403) - continued									
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	98.0	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	86.8	70.0	130	----



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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 Skrypnyk	<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:	dskrypnyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
	<input type="checkbox"/> Yes <input type="checkbox"/> No		brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

Invoice To Same as Report ?		Client / Project Information		Analysis Request	
Hardcopy of Invoice with Report?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite		
Contact:		LSD:	(includes 2:1 pH)		
Address:		Quote #:			
Phone:					

Lab/Work Order # (lab use only)	ALS Contact:	Sampler:					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
BA2236-A-1		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-2		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-3		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-4		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-5		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-6		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-7		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-8		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-9		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-10		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-11		07-Sep-22	9:00	Soil	X	X		X	1
BA2236-A-12		07-Sep-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22C1778



Telephone : +1 604 253 4188

Special Instructions: _____

(CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy):	Time (hh-mm):	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	13-SEP-22	0800	<i>[Signature]</i>	SEP 13 2022	11:45am	21, 21 °C				