

Bottom Ash Data

2021 Week 38

The following analytical report represents bottom ash composite results for week 38 of 2021 (September 12, 2021 to September 18, 2021).

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 : **VA21C0685**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000050390
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 : 21-Sep-2021 12:00
Date Analysis Commenced : 25-Sep-2021
Issue Date : 04-Oct-2021 09:28

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>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		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	BA2138-A-1	BA2138-A-2	BA2138-A-3	BA2138-A-4	BA2138-A-5
(Matrix: Soil/Solid)					Client sampling date / time	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-001	VA21C0685-002	VA21C0685-003	VA21C0685-004	VA21C0685-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	22.8	22.2	22.5	21.6	21.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	10.7	10.9	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36200	24200	34200	52900	37300	
antimony	7440-36-0	E440	0.10	mg/kg	108	109	131	108	125	
arsenic	7440-38-2	E440	0.10	mg/kg	24.8	26.7	35.9	28.3	31.2	
barium	7440-39-3	E440	0.50	mg/kg	632	655	528	554	487	
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.29	0.36	0.41	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	9.12	11.8	9.76	11.2	10.3	
boron	7440-42-8	E440	5.0	mg/kg	177	158	198	154	161	
cadmium	7440-43-9	E440	0.020	mg/kg	25.7	8.64	10.3	9.61	14.0	
calcium	7440-70-2	E440	50	mg/kg	128000	111000	134000	134000	138000	
chromium	7440-47-3	E440	0.50	mg/kg	161	141	142	164	168	
cobalt	7440-48-4	E440	0.10	mg/kg	20.6	28.3	238	65.2	153	
copper	7440-50-8	E440	0.50	mg/kg	3790	3520	7840	6060	2050	
iron	7439-89-6	E440	50	mg/kg	70100	42800	51600	67500	54800	
lead	7439-92-1	E440	0.50	mg/kg	414	369	397	466	496	
lithium	7439-93-2	E440	2.0	mg/kg	22.5	21.7	27.5	29.7	28.7	
magnesium	7439-95-4	E440	20	mg/kg	11800	9240	13200	11900	12500	
manganese	7439-96-5	E440	1.0	mg/kg	816	747	942	1030	1290	
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	23.6	22.9	25.0	44.5	25.2	
nickel	7440-02-0	E440	0.50	mg/kg	127	97.3	191	243	169	
phosphorus	7723-14-0	E440	50	mg/kg	9450	8680	10000	12300	9890	
potassium	7440-09-7	E440	100	mg/kg	5410	4490	5620	5710	5150	
selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.33	0.37	0.43	0.39	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	----	5.43	----	
silver	7440-22-4	E440	0.10	mg/kg	6.58	7.91	4.55	----	6.04	
sodium	7440-23-5	E440	50	mg/kg	16100	14100	16200	15500	14400	
strontium	7440-24-6	E440	0.50	mg/kg	344	503	320	365	363	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2138-A-1	BA2138-A-2	BA2138-A-3	BA2138-A-4	BA2138-A-5
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-001	VA21C0685-002	VA21C0685-003	VA21C0685-004	VA21C0685-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	11400	10500	12400	12100	13200	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	490	108	115	102	104	
titanium	7440-32-6	E440	1.0	mg/kg	530	620	417	648	686	
tungsten	7440-33-7	E440	0.50	mg/kg	9.57	11.6	12.4	136	11.9	
uranium	7440-61-1	E440	0.050	mg/kg	2.83	2.64	2.92	3.50	3.17	
vanadium	7440-62-2	E440	0.20	mg/kg	40.0	35.2	39.6	47.2	51.5	
zinc	7440-66-6	E440	2.0	mg/kg	4490	3800	5090	4310	5630	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	<1.0	1.5	2.8	1.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.5	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.08	6.77	8.24	7.78	8.70	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	5.94	6.04	6.55	6.42	6.21	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.54	1.98	1.95	1.84	1.91	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.156	0.156	0.345	0.178	0.152	
calcium, TCLP	7440-70-2	E444	10	mg/L	1820	1960	1850	1810	1870	
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	0.878	1.25	0.657	0.650	1.45	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.667	0.722	0.589	0.606	0.772	
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	0.63	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	128	145	132	129	137	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.58	0.64	0.49	0.75	0.56	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2138-A-1	BA2138-A-2	BA2138-A-3	BA2138-A-4	BA2138-A-5
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-001	VA21C0685-002	VA21C0685-003	VA21C0685-004	VA21C0685-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	36.1	94.2	30.0	41.3	40.0	40.0
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 (Matrix: Soil/Solid)					Client sample ID	BA2138-A-6	BA2138-A-7	BA2138-A-8	BA2138-A-9	BA2138-A-10
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-006	VA21C0685-007	VA21C0685-008	VA21C0685-009	VA21C0685-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	22.0	22.2	22.3	22.4	21.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	10.7	10.6	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34900	31900	28500	33100	30400	
antimony	7440-36-0	E440	0.10	mg/kg	120	130	127	114	142	
arsenic	7440-38-2	E440	0.10	mg/kg	25.9	28.6	32.2	28.9	39.2	
barium	7440-39-3	E440	0.50	mg/kg	622	542	535	582	458	
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.38	0.36	0.40	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	126	9.39	21.3	10.6	12.4	
boron	7440-42-8	E440	5.0	mg/kg	238	172	165	143	154	
cadmium	7440-43-9	E440	0.020	mg/kg	12.7	11.4	12.4	9.79	12.2	
calcium	7440-70-2	E440	50	mg/kg	138000	132000	137000	132000	143000	
chromium	7440-47-3	E440	0.50	mg/kg	406	185	202	154	309	
cobalt	7440-48-4	E440	0.10	mg/kg	1150	67.0	32.0	52.7	108	
copper	7440-50-8	E440	0.50	mg/kg	1860	5300	9960	3050	2500	
iron	7439-89-6	E440	50	mg/kg	63600	59000	60000	54700	51300	
lead	7439-92-1	E440	0.50	mg/kg	4510	1620	456	509	522	
lithium	7439-93-2	E440	2.0	mg/kg	55.0	68.4	23.8	23.4	28.6	
magnesium	7439-95-4	E440	20	mg/kg	11900	11400	11900	10600	11500	
manganese	7439-96-5	E440	1.0	mg/kg	787	1000	1050	860	780	
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	24.9	23.6	35.5	23.8	31.3	
nickel	7440-02-0	E440	0.50	mg/kg	410	229	169	126	503	
phosphorus	7723-14-0	E440	50	mg/kg	10100	9850	10700	9170	10900	
potassium	7440-09-7	E440	100	mg/kg	5740	5160	5700	5160	5470	
selenium	7782-49-2	E440	0.20	mg/kg	0.32	0.38	0.33	0.40	0.37	
silver	7440-22-4	E440	0.10	mg/kg	17.9	15.4	7.63	4.82	7.78	
sodium	7440-23-5	E440	50	mg/kg	16300	15900	15300	15300	14900	
strontium	7440-24-6	E440	0.50	mg/kg	326	334	332	396	383	
sulfur	7704-34-9	E440	1000	mg/kg	12200	12500	13800	12200	14700	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2138-A-6	BA2138-A-7	BA2138-A-8	BA2138-A-9	BA2138-A-10
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-006	VA21C0685-007	VA21C0685-008	VA21C0685-009	VA21C0685-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	171	311	120	95.8	114	
titanium	7440-32-6	E440	1.0	mg/kg	359	360	303	340	281	
tungsten	7440-33-7	E440	0.50	mg/kg	10.1	20.9	16.9	10.4	18.8	
uranium	7440-61-1	E440	0.050	mg/kg	2.95	2.94	3.41	2.90	3.48	
vanadium	7440-62-2	E440	0.20	mg/kg	43.6	43.5	43.4	42.7	42.0	
zinc	7440-66-6	E440	2.0	mg/kg	4220	5060	4960	3890	5370	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.5	1.0	1.2	1.3	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.4	11.5	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.85	8.92	9.33	8.73	8.82	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.14	6.05	6.10	6.19	6.05	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.11	2.01	2.02	1.95	3.38	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.160	0.512	0.286	0.143	0.156	
calcium, TCLP	7440-70-2	E444	10	mg/L	2010	1980	2010	1960	2020	
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	1.03	1.16	1.16	1.04	1.19	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.09	1.75	1.10	1.15	0.958	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	0.30	0.37	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	157	140	147	140	144	
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	0.50	0.56	0.53	0.63	0.50	
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	BA2138-A-6	BA2138-A-7	BA2138-A-8	BA2138-A-9	BA2138-A-10
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00	15-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-006	VA21C0685-007	VA21C0685-008	VA21C0685-009	VA21C0685-010	
					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	44.2	60.0	59.3	46.6	49.2	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2138-A-11	BA2138-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	15-Sep-2021 09:00	15-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-011	VA21C0685-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	22.2	21.5	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.9	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	25300	31300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	309	108	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	34.5	30.9	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	449	453	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.36	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	23.2	11.0	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	162	159	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	12.4	9.95	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	144000	122000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	156	972	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	45.3	156	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	7740	2090	----	----	----	
iron	7439-89-6	E440	50	mg/kg	53900	79400	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	2620	427	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	23.3	26.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11300	10800	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	737	969	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	25.7	124	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	180	588	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10700	9300	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5490	5170	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.41	0.32	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	12.0	4.47	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14500	13200	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	367	302	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14600	12000	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2138-A-11	BA2138-A-12	----	----	----
Client sampling date / time					15-Sep-2021 09:00	15-Sep-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-011	VA21C0685-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	202	97.4	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	372	439	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	18.2	10.0	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	3.69	3.04	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	42.0	44.7	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	6430	4460	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.0	1.7	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.40	9.58	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.07	6.13	----	----	----	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.20	2.27	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.143	0.174	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2010	1980	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.753	1.05	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.937	0.771	----	----	----	
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	143	152	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.53	0.71	----	----	----	
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	BA2138-A-11	BA2138-A-12	----	----	----
					Client sampling date / time	15-Sep-2021 09:00	15-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C0685-011	VA21C0685-012	-----	-----	-----	
					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	48.0	60.6	----	----	----	
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	: VA21C0685	Page	: 1 of 15
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 21-Sep-2021 12:00
PO	: VANCO 0000050390	Issue Date	: 04-Oct-2021 09:28
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

- Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

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	VA21C0685-001	BA2138-A-1	antimony	7440-36-0	E440	62.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	arsenic	7440-38-2	E440	36.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	bismuth	7440-69-9	E440	50.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	cadmium	7440-43-9	E440	71.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	cobalt	7440-48-4	E440	131 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	copper	7440-50-8	E440	67.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	lead	7439-92-1	E440	156 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	lithium	7439-93-2	E440	92.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	nickel	7440-02-0	E440	48.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	silver	7440-22-4	E440	75.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	tin	7440-31-5	E440	95.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C0685-001	BA2138-A-1	zinc	7440-66-6	E440	49.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2138-A-4	E440.Ag	15-Sep-2021	01-Oct-2021	----	----		02-Oct-2021	----	17 days		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-1	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-10	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-11	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-12	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-2	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-3	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	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 BA2138-A-4	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-5	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-6	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-7	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-8	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2138-A-9	E510	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2138-A-1	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2138-A-10	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2138-A-11	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	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 BA2138-A-12	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-2	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-3	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-4	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-5	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-6	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-7	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-8	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2138-A-9	E440	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-1	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-10	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-11	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-12	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-2	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-3	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-4	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-5	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2138-A-6	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----	



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 BA2138-A-7	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2138-A-8	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2138-A-9	E144	15-Sep-2021	----	----	----		28-Sep-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-1	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-10	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-11	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-12	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-2	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-3	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	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 BA2138-A-4	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-5	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-6	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-7	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-8	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2138-A-9	E108	15-Sep-2021	29-Sep-2021	----	----		30-Sep-2021	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2138-A-1	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2138-A-10	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2138-A-11	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	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	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-12	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-2	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-3	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-4	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-5	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-6	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-7	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-8	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2138-A-9	E512	25-Sep-2021	----	----	----		28-Sep-2021	----	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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-1	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-10	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-11	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-12	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-2	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-3	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-4	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-5	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2138-A-6	E444	25-Sep-2021	----	----	----		28-Sep-2021	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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2138-A-7	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2138-A-8	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2138-A-9	E444	25-Sep-2021	----	----	----		28-Sep-2021	180 days	13 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-1	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-10	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-11	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-12	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-2	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-3	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-4	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-5	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-6	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-7	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-8	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2138-A-9	EPP444	15-Sep-2021	25-Sep-2021	----	----		----	----	----		

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	305497	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	305496	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	305499	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	305498	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	308498	1	3	33.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	305497	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	305496	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	305499	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	305498	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	308498	1	3	33.3	5.0	✔
Mercury by CVAAS (TCLP)	E512	305185	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	305497	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	305186	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	305496	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	305499	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	305185	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	305186	1	12	8.3	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA21C0685

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000050390
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 21-Sep-2021 12:00
Date Analysis Commenced : 25-Sep-2021
Issue Date : 04-Oct-2021 09:28

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Caleb Deroche (Lab Analyst, Metals), Kevin Duarte (Supervisor - Metals ICP Instrumentation, Metals), Ophelia Chiu (Department Manager - Organics, Organics), and Owen Cheng (Metals).

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Work Order : VA21C0685
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



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: 305498)											
VA21C0685-001	BA2138-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	0.2%	5%	----
Physical Tests (QC Lot: 305499)											
VA21C0685-001	BA2138-A-1	moisture	----	E144	0.25	%	22.8	22.4	1.89%	20%	----
Metals (QC Lot: 305496)											
VA21C0685-001	BA2138-A-1	aluminum	7429-90-5	E440	50	mg/kg	36200	31300	14.7%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	108	206	62.7%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	24.8	35.7	36.1%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	632	645	1.97%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.40	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	9.12	15.3	50.5%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	177	172	3.08%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	25.7	12.2	71.0%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	128000	144000	12.1%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	161	188	15.5%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	20.6	98.9	131%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	3790	7690	67.9%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	70100	68700	2.09%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	414	3320	156%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.5	61.3	92.8%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	11800	12300	4.11%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	816	866	5.98%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	23.6	29.7	23.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	127	208	48.0%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	9450	11100	16.4%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5410	5820	7.22%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.45	0.14	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.58	14.6	75.7%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	16100	16200	0.544%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	344	442	24.7%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11400	13500	16.6%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	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: 305496) - continued											
VA21C0685-001	BA2138-A-1	tin	7440-31-5	E440	2.0	mg/kg	490	174	95.0%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	530	422	22.5%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	9.57	10.8	11.9%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	2.83	3.22	12.9%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	40.0	46.4	14.8%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4490	7470	49.8%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.1	0.1	Diff <2x LOR	----
Metals (QC Lot: 305497)											
VA21C0685-001	BA2138-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: 305499)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 305496)						
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: 305496) - 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: 305497)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 308498)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 305185)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 305186)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 305498)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.5	95.0	105	---
Physical Tests (QCLot: 305499)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 305496)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	97.7	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	111	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.0	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.5	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.6	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.7	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.3	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.8	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	90.1	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	102	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	97.1	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.4	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	97.1	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	94.8	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	100	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.4	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	98.3	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.9	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.0	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.0	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	92.4	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: 305496) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.9	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.0	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.1	80.0	120	----
Metals (QCLot: 305497)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	107	80.0	120	----
Metals (QCLot: 308498)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	96.5	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 305185)										
VA21C0685-001	BA2138-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 305186)										
VA21C0685-001	BA2138-A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.6 mg/L	12.5 mg/L	109	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.240 mg/L	0.25 mg/L	96.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.49 mg/L	10 mg/L	84.9	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.235 mg/L	0.25 mg/L	93.9	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	1.28 mg/L	1.25 mg/L	103	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	2.50 mg/L	2.5 mg/L	99.9	50.0	140	----
		iron, TCLP	7439-89-6	E444	242 mg/L	250 mg/L	96.7	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	257 mg/L	250 mg/L	103	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.56 mg/L	2.5 mg/L	102	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.80 mg/L	5 mg/L	96.1	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.109 mg/L	0.1 mg/L	109	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.02 mg/L	5 mg/L	100	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	99.0	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 305496)									
QC-305496-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	101	70.0	130	----
QC-305496-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	98.7	70.0	130	----
QC-305496-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	97.2	70.0	130	----
QC-305496-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	94.1	70.0	130	----
QC-305496-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
QC-305496-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	----
QC-305496-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	96.7	70.0	130	----
QC-305496-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	101	70.0	130	----
QC-305496-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
QC-305496-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	98.8	70.0	130	----
QC-305496-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	97.0	70.0	130	----
QC-305496-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	96.9	70.0	130	----
QC-305496-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-305496-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
QC-305496-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	96.6	70.0	130	----
QC-305496-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	99.7	70.0	130	----
QC-305496-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	103	70.0	130	----
QC-305496-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	96.4	70.0	130	----
QC-305496-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	95.6	70.0	130	----
QC-305496-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	108	70.0	130	----
QC-305496-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
QC-305496-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
QC-305496-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	98.4	40.0	160	----
QC-305496-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	105	70.0	130	----
QC-305496-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----
QC-305496-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-305496-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----
QC-305496-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	93.1	70.0	130	----
QC-305496-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	97.9	70.0	130	----

Page : 11 of 11
 Work Order : VA21C0685
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 305497)									
QC-305497-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	101	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 Skrypnyk	<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Address:	5150 Riverbend Drive Burnaby BC	Email 1: smckinney@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 2: rjohnson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
	Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3: dskrypnyk@covanta.com		Analysis Request	
		brent.kirkpatrick@metrovancover.org			
		Sarah.Wellman@metrovancover.org			

Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		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:																
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
BA2138-A-1	<p>Environmental Division Vancouver Work Order Reference VA21C0685</p> <p>Telephone : +1 604 253 4188</p>	15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-2		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-3		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-4		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-5		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-6		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-7		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-8		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-9		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-10		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-11		15-Sep-21	9:00	Soil	X	X		X											1
BA2138-A-12		15-Sep-21	9:00	Soil	X	X		X											1

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No? If Yes add SIF
	21-Sep-21	0800		21	12	21 °C				