

Bottom Ash Data

2021 Week 12

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on March 31, 2021. The data represents bottom ash composite results for week 12 of 2021 (March 14, 2021 to March 20, 2021).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA21A5416**
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 : 23-Mar-2021 13:00
Date Analysis Commenced : 26-Mar-2021
Issue Date : 31-Mar-2021 09:26

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>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Russell Zhang		Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	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	BA2112-A-1	BA2112-A-2	BA2112-A-3	BA2112-A-4	BA2112-A-5
(Matrix: Soil/Solid)					Client sampling date / time	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-001	VA21A5416-002	VA21A5416-003	VA21A5416-004	VA21A5416-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.1	20.0	17.5	20.0	17.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.0	11.9	12.1	12.0	12.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38200	40100	31300	34500	30400	
antimony	7440-36-0	E440	0.10	mg/kg	102	78.7	181	126	105	
arsenic	7440-38-2	E440	0.10	mg/kg	25.7	22.1	29.7	32.4	27.2	
barium	7440-39-3	E440	0.50	mg/kg	549	650	653	566	671	
beryllium	7440-41-7	E440	0.10	mg/kg	0.45	0.40	0.40	0.38	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	6.88	4.05	6.70	9.79	22.4	
boron	7440-42-8	E440	5.0	mg/kg	243	176	221	231	249	
cadmium	7440-43-9	E440	0.020	mg/kg	9.50	8.91	8.39	16.5	10.4	
calcium	7440-70-2	E440	50	mg/kg	138000	123000	138000	157000	136000	
chromium	7440-47-3	E440	0.50	mg/kg	291	139	436	154	176	
cobalt	7440-48-4	E440	0.10	mg/kg	74.2	20.8	107	35.0	145	
copper	7440-50-8	E440	0.50	mg/kg	1840	2920	4340	3070	5040	
iron	7439-89-6	E440	50	mg/kg	66400	60400	81700	59400	87700	
lead	7439-92-1	E440	0.50	mg/kg	956	1410	5540	1140	499	
lithium	7439-93-2	E440	2.0	mg/kg	23.8	17.9	44.6	22.4	30.0	
magnesium	7439-95-4	E440	20	mg/kg	12000	10600	10100	12200	12100	
manganese	7439-96-5	E440	1.0	mg/kg	1990	1850	1220	1040	886	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0924	0.0657	0.0638	0.0986	0.0715	
molybdenum	7439-98-7	E440	0.10	mg/kg	24.8	19.2	24.9	15.6	14.0	
nickel	7440-02-0	E440	0.50	mg/kg	135	131	330	201	858	
phosphorus	7723-14-0	E440	50	mg/kg	9870	7100	10100	9330	10700	
potassium	7440-09-7	E440	100	mg/kg	4320	4020	3940	4480	4700	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.42	0.44	0.39	0.39	
silver	7440-22-4	E440	0.10	mg/kg	4.92	4.20	9.04	6.14	6.66	
sodium	7440-23-5	E440	50	mg/kg	14200	13700	13600	14500	14600	
strontium	7440-24-6	E440	0.50	mg/kg	336	275	274	328	304	
sulfur	7704-34-9	E440	1000	mg/kg	12500	9600	11100	15300	14100	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2112-A-1	BA2112-A-2	BA2112-A-3	BA2112-A-4	BA2112-A-5
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-001	VA21A5416-002	VA21A5416-003	VA21A5416-004	VA21A5416-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.051	<0.050	0.060	0.055	
tin	7440-31-5	E440	2.0	mg/kg	114	102	2300	148	162	
titanium	7440-32-6	E440	1.0	mg/kg	726	936	878	468	528	
tungsten	7440-33-7	E440	0.50	mg/kg	11.2	11.0	8.83	8.16	11.9	
uranium	7440-61-1	E440	0.050	mg/kg	4.32	3.49	4.03	4.95	4.54	
vanadium	7440-62-2	E440	0.20	mg/kg	44.1	45.2	43.0	49.0	54.3	
zinc	7440-66-6	E440	2.0	mg/kg	5630	4050	5370	5410	6090	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.4	1.2	1.4	1.3	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	12.0	12.0	12.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.69	7.29	8.69	7.93	8.52	
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	5.92	6.44	6.11	6.59	6.34	
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	2.27	2.02	2.40	2.19	2.18	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.243	0.158	0.163	0.159	0.224	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	1910	2190	2090	2030	
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	1.01	0.894	0.989	0.934	0.957	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.648	0.712	0.069	0.997	0.745	
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	140	137	146	142	135	
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	0.70	0.43	0.80	0.50	0.65	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2112-A-1	BA2112-A-2	BA2112-A-3	BA2112-A-4	BA2112-A-5
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-001	VA21A5416-002	VA21A5416-003	VA21A5416-004	VA21A5416-005	
					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	75.5	35.1	43.6	47.5	35.1	35.1
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	BA2112-A-6	BA2112-A-7	BA2112-A-8	BA2112-A-9	BA2112-A-10
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-006	VA21A5416-007	VA21A5416-008	VA21A5416-009	VA21A5416-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.1	19.1	18.1	18.3	20.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	12.0	12.0	12.1	12.1	12.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	27800	32700	38100	30000	29800	
antimony	7440-36-0	E440	0.10	mg/kg	102	124	91.2	92.6	162	
arsenic	7440-38-2	E440	0.10	mg/kg	24.8	29.0	24.5	22.7	27.7	
barium	7440-39-3	E440	0.50	mg/kg	559	591	578	601	504	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.39	0.38	0.37	0.34	
bismuth	7440-69-9	E440	0.20	mg/kg	6.77	6.06	6.10	6.07	8.51	
boron	7440-42-8	E440	5.0	mg/kg	225	257	165	256	190	
cadmium	7440-43-9	E440	0.020	mg/kg	9.08	9.50	8.74	9.64	12.0	
calcium	7440-70-2	E440	50	mg/kg	132000	131000	126000	122000	129000	
chromium	7440-47-3	E440	0.50	mg/kg	205	210	169	176	159	
cobalt	7440-48-4	E440	0.10	mg/kg	85.2	176	43.7	44.2	72.8	
copper	7440-50-8	E440	0.50	mg/kg	1970	15200	1250	2430	23300	
iron	7439-89-6	E440	50	mg/kg	60300	57400	72100	73000	56200	
lead	7439-92-1	E440	0.50	mg/kg	310	409	548	331	356	
lithium	7439-93-2	E440	2.0	mg/kg	23.2	18.3	20.9	16.6	18.2	
magnesium	7439-95-4	E440	20	mg/kg	10800	11600	10700	9190	10500	
manganese	7439-96-5	E440	1.0	mg/kg	778	744	887	954	706	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0825	0.0707	0.0570	0.0614	0.104	
molybdenum	7439-98-7	E440	0.10	mg/kg	15.6	20.4	27.5	12.3	13.8	
nickel	7440-02-0	E440	0.50	mg/kg	156	206	159	98.4	123	
phosphorus	7723-14-0	E440	50	mg/kg	8770	7960	8100	7890	10100	
potassium	7440-09-7	E440	100	mg/kg	4180	4050	4040	3980	3770	
selenium	7782-49-2	E440	0.20	mg/kg	0.41	0.35	0.31	0.33	0.38	
silver	7440-22-4	E440	0.10	mg/kg	4.30	3.74	4.36	5.56	5.67	
sodium	7440-23-5	E440	50	mg/kg	13800	13000	13000	13600	12400	
strontium	7440-24-6	E440	0.50	mg/kg	282	272	251	491	286	
sulfur	7704-34-9	E440	1000	mg/kg	13400	12300	11100	11100	13500	
thallium	7440-28-0	E440	0.050	mg/kg	0.054	<0.050	0.052	0.053	0.057	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2112-A-6	BA2112-A-7	BA2112-A-8	BA2112-A-9	BA2112-A-10
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-006	VA21A5416-007	VA21A5416-008	VA21A5416-009	VA21A5416-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	100	131	197	279	159	
titanium	7440-32-6	E440	1.0	mg/kg	411	486	685	529	312	
tungsten	7440-33-7	E440	0.50	mg/kg	7.97	7.75	8.56	8.78	9.77	
uranium	7440-61-1	E440	0.050	mg/kg	4.56	4.12	4.02	3.94	4.45	
vanadium	7440-62-2	E440	0.20	mg/kg	43.4	42.3	47.5	39.4	43.2	
zinc	7440-66-6	E440	2.0	mg/kg	3810	3460	5230	6030	4110	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.2	1.3	1.3	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.1	12.0	12.1	12.1	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.99	9.30	9.90	9.51	9.41	
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	6.55	6.38	6.39	6.30	6.55	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.23	2.13	2.10	2.10	2.33	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.146	0.126	0.147	0.163	0.714	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	1970	2000	1970	2080	
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	0.655	0.370	0.734	0.446	0.688	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.425	0.129	1.01	0.654	0.477	
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	131	134	125	144	140	
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	0.93	0.58	0.60	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	BA2112-A-6	BA2112-A-7	BA2112-A-8	BA2112-A-9	BA2112-A-10
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00	17-Mar-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-006	VA21A5416-007	VA21A5416-008	VA21A5416-009	VA21A5416-010	
					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	32.8	31.6	31.3	34.7	29.9	
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	BA2112-A-11	BA2112-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	17-Mar-2021 09:00	17-Mar-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-011	VA21A5416-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	17.7	20.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.9	12.0	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36900	48100	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	124	129	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	25.3	170	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	576	557	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	6.11	8.61	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	196	159	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	33.4	9.97	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	136000	135000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	159	169	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	36.4	32.4	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1930	5350	----	----	----	
iron	7439-89-6	E440	50	mg/kg	68600	71900	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	355	341	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	24.7	24.7	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10900	9990	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	980	812	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.228	0.0879	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	16.8	16.3	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	145	393	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9570	10200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4370	4360	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.42	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	3.73	4.31	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14500	14300	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	299	296	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14400	13200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.055	0.057	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2112-A-11	BA2112-A-12	----	----	----
Client sampling date / time					17-Mar-2021 09:00	17-Mar-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-011	VA21A5416-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	164	111	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	781	1260	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	8.83	11.6	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.66	4.85	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	47.4	48.4	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5250	3530	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.4	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.0	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.63	9.89	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.24	6.70	---	---	---	
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	2.25	2.35	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.198	0.214	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	2140	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.928	1.12	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.494	0.593	---	---	---	
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	135	148	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.75	0.53	---	---	---	
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	BA2112-A-11	BA2112-A-12	----	----	----
					Client sampling date / time	17-Mar-2021 09:00	17-Mar-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A5416-011	VA21A5416-012	-----	-----	-----	
					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	50.4	35.1	----	----	----	
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	: VA21A5416	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 23-Mar-2021 13:00
PO	: VANCO 0000050390	Issue Date	: 31-Mar-2021 09:26
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	Anonymous	Anonymous	aluminum	7429-90-5	E440	50.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	titanium	7440-32-6	E440	61.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	vanadium	7440-62-2	E440	56.2 % 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 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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 BA2112-A-1	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-10	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-11	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-12	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-2	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-3	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-4	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✓	30-Mar-2021	15 days	0 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-5	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✔	30-Mar-2021	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-6	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✔	30-Mar-2021	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-7	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✔	30-Mar-2021	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-8	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✔	30-Mar-2021	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2112-A-9	E510	17-Mar-2021	30-Mar-2021	28 days	12 days	✔	30-Mar-2021	15 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2112-A-1	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2112-A-10	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2112-A-11	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2112-A-12	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-2	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-3	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-4	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-5	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-6	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-7	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-8	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2112-A-9	E440	17-Mar-2021	30-Mar-2021	180 days	12 days	✔	30-Mar-2021	167 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2112-A-1	E144	17-Mar-2021	----	----	----		29-Mar-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 BA2112-A-10	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-11	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-12	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-2	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-3	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-4	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-5	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-6	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2112-A-7	E144	17-Mar-2021	----	----	----		29-Mar-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 BA2112-A-8	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2112-A-9	E144	17-Mar-2021	----	----	----		29-Mar-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-1	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-10	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-11	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-12	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-2	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-3	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-4	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-5	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-6	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-7	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-8	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2112-A-9	E108	17-Mar-2021	30-Mar-2021	30 days	12 days	✔	30-Mar-2021	17 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-1	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-10	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-11	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-12	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 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) BA2112-A-2	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-3	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-4	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-5	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-6	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-7	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-8	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2112-A-9	E512	26-Mar-2021	----	----	----		28-Mar-2021	37 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-1	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 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) BA2112-A-10	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-11	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-12	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-2	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-3	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-4	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-5	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-6	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2112-A-7	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 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) BA2112-A-8	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2112-A-9	E444	26-Mar-2021	----	----	----		28-Mar-2021	189 days	11 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-1	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-10	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-11	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-12	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-2	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-3	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-4	EPP444	17-Mar-2021	26-Mar-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: 28 day HT (e.g. Hg, CrVI) BA2112-A-5	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-6	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-7	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-8	EPP444	17-Mar-2021	26-Mar-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2112-A-9	EPP444	17-Mar-2021	26-Mar-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	170548	1	17	5.8	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	170547	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	170552	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	170549	1	19	5.2	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	170548	2	17	11.7	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	170547	2	18	11.1	10.0	✔
Moisture Content by Gravimetry	E144	170552	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	170549	1	19	5.2	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	170262	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	170548	1	17	5.8	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	170263	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	170547	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	170552	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	170262	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	170263	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)	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. 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
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.



<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 : VA21A5416

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 : 23-Mar-2021 13:00
Date Analysis Commenced : 26-Mar-2021
Issue Date : 31-Mar-2021 09:26

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 Angela Ren (Team Leader - Metals), Dee Lee (Analyst), Ophelia Chiu (Department Manager - Organics), Russell Zhang (Analyst), and Shaneel Dayal (Analyst).

Page : 2 of 11
Work Order : VA21A5416
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: 170549)											
VA21A5412-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.12	7.15	0.420%	5%	----
Physical Tests (QC Lot: 170552)											
VA21A5416-001	BA2112-A-1	moisture	----	E144	0.25	%	19.1	19.9	4.03%	20%	----
Metals (QC Lot: 170547)											
VA21A5412-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	526	314	50.5%	40%	DUP-H
		antimony	7440-36-0	E440	0.10	mg/kg	2.29	2.06	10.5%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	5.20	4.22	20.9%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	130	125	4.48%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	2.26	2.22	1.52%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	25700	22600	12.7%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	66.1	64.3	2.78%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	2.79	2.62	6.53%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	54.8	53.9	1.75%	30%	----
		iron	7439-89-6	E440	50	mg/kg	323000	312000	3.32%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	0.51	<0.50	0.01	Diff <2x LOR	----
		lithium	7439-93-2	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	2130	1970	7.64%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	93.9	88.5	5.93%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	15.4	14.5	6.14%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	59.3	57.5	3.00%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	9870	9450	4.30%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	220	190	30	Diff <2x LOR	----
		selenium	7782-49-2	E440	0.20	mg/kg	980	979	0.133%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	93	68	25	Diff <2x LOR	----
		strontium	7440-24-6	E440	0.50	mg/kg	45.9	44.9	2.18%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	14200	13300	6.73%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.119	0.110	0.008	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: 170547) - continued											
VA21A5412-001	Anonymous	tin	7440-31-5	E440	2.0	mg/kg	3.4	3.3	0.10	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	14.0	7.5	61.0%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	35.8	34.6	3.54%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	13.3	7.47	56.2%	30%	DUP-H
		zinc	7440-66-6	E440	2.0	mg/kg	136	130	4.89%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
Metals (QC Lot: 170548)											
VA21A5416-001	BA2112-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0924	0.116	0.0234	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: 170552)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 170547)						
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: 170547) - 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: 170548)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
TCLP Metals (QCLot: 170262)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 170263)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	---
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	---
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	---
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	---
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	---
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	---
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	---
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	---
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	---
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	---
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	---
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	---
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	---
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	---
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	---
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	---
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	---
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	---
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	---



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 170549)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 170552)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 170547)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	114	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	109	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	109	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	112	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	108	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	118	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	115	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	99.4	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	110	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	118	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	107	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	106	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	108	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: 170547) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	113	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	108	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	106	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	80.0	120	----
Metals (QCLot: 170548)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	114	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: 170262)										
VA21A5416-001	BA2112-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	95.8	50.0	140	----
TCLP Metals (QCLot: 170263)										
VA21A5416-001	BA2112-A-1	antimony, TCLP	7440-36-0	E444	5.6 mg/L	5 mg/L	112	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.5 mg/L	5 mg/L	109	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.2 mg/L	12.5 mg/L	114	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.281 mg/L	0.25 mg/L	112	50.0	140	----
		boron, TCLP	7440-42-8	E444	11.2 mg/L	10 mg/L	112	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.287 mg/L	0.25 mg/L	115	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	1.40 mg/L	1.25 mg/L	112	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	2.68 mg/L	2.5 mg/L	107	50.0	140	----
		iron, TCLP	7439-89-6	E444	265 mg/L	250 mg/L	106	50.0	140	----
		lead, TCLP	7439-92-1	E444	11.0 mg/L	10 mg/L	110	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	294 mg/L	250 mg/L	118	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.66 mg/L	2.5 mg/L	107	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.80 mg/L	5 mg/L	116	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.125 mg/L	0.1 mg/L	125	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	105	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.53 mg/L	5 mg/L	110	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.84 mg/L	0.75 mg/L	112	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	104	70.0	130	----



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: 170547)									
QC-170547-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
QC-170547-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
QC-170547-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	122	70.0	130	----
QC-170547-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	114	70.0	130	----
QC-170547-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	118	70.0	130	----
QC-170547-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	135	40.0	160	----
QC-170547-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	114	70.0	130	----
QC-170547-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	119	70.0	130	----
QC-170547-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	----
QC-170547-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	110	70.0	130	----
QC-170547-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
QC-170547-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	108	70.0	130	----
QC-170547-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
QC-170547-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	116	70.0	130	----
QC-170547-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-170547-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
QC-170547-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	113	70.0	130	----
QC-170547-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
QC-170547-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	108	70.0	130	----
QC-170547-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	122	70.0	130	----
QC-170547-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	114	70.0	130	----
QC-170547-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
QC-170547-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	97.1	40.0	160	----
QC-170547-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	105	70.0	130	----
QC-170547-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	128	70.0	130	----
QC-170547-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	116	70.0	130	----
QC-170547-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	114	70.0	130	----
QC-170547-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	111	70.0	130	----
QC-170547-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	111	70.0	130	----

Page : 11 of 11
 Work Order : VA21A5416
 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: 170548)									
QC-170548-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----




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	
	Bumaby BC	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone:	804-521-1025	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		Analysis Request	
			Sarah.Wellman@metrovancover.org			

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

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)	iers
BA2112-A-1		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-2		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-3		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-4		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-5		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-6		17-Mar-21	9:00	Soil	X	X		X	
BA2112-A-7		17-Mar-21	9:00	Soil	X	X		X	1
BA2112-A-8		17-Mar-21	9:00	Soil	X	X		X	1
BA2112-A-9		17-Mar-21	9:00	Soil	X	X		X	1
BA2112-A-10		17-Mar-21	9:00	Soil	X	X		X	1
BA2112-A-11		17-Mar-21	9:00	Soil	X	X		X	1
BA2112-A-12		17-Mar-21	9:00	Soil	X	X		X	1

**Environmental Division
 Vancouver**
 Work Order Reference
VA21A5416



Telephone : +1 604 253 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
	23-Mar-21	0900				°C				Yes / No ? If Yes add SIF