

Bottom Ash Data

2021 Week 17

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on May 6, 2021. The data represents bottom ash composite results for week 17 of 2021 (April 18, 2021 to April 24, 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 : **VA21A7853**
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 : 27-Apr-2021 12:15
Date Analysis Commenced : 28-Apr-2021
Issue Date : 06-May-2021 12:10

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>
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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	BA2117-A-1	BA2117-A-2	BA2117-A-3	BA2117-A-4	BA2117-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-001	VA21A7853-002	VA21A7853-003	VA21A7853-004	VA21A7853-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.4	19.5	18.9	19.3	19.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.3	11.3	11.2	11.3	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	45900	40400	40100	34100	36800	
antimony	7440-36-0	E440	0.10	mg/kg	132	142	155	121	120	
arsenic	7440-38-2	E440	0.10	mg/kg	28.7	33.2	31.1	27.2	23.8	
barium	7440-39-3	E440	0.50	mg/kg	626	596	578	552	618	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.40	0.39	0.36	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	7.88	11.0	7.50	7.08	7.46	
boron	7440-42-8	E440	5.0	mg/kg	200	174	243	231	183	
cadmium	7440-43-9	E440	0.020	mg/kg	13.0	159	12.6	13.9	9.89	
calcium	7440-70-2	E440	50	mg/kg	130000	142000	144000	131000	123000	
chromium	7440-47-3	E440	0.50	mg/kg	216	226	364	149	202	
cobalt	7440-48-4	E440	0.10	mg/kg	117	400	67.3	83.6	39.3	
copper	7440-50-8	E440	0.50	mg/kg	2150	23200	3920	5180	11300	
iron	7439-89-6	E440	50	mg/kg	72200	68200	63100	61300	83900	
lead	7439-92-1	E440	0.50	mg/kg	2000	724	444	712	3650	
lithium	7439-93-2	E440	2.0	mg/kg	22.9	36.2	29.4	27.0	23.6	
magnesium	7439-95-4	E440	20	mg/kg	12400	12800	13400	12400	13500	
manganese	7439-96-5	E440	1.0	mg/kg	852	1030	1310	1280	1120	
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	24.1	18.7	16.1	30.2	25.8	
nickel	7440-02-0	E440	0.50	mg/kg	271	434	1200	187	695	
phosphorus	7723-14-0	E440	50	mg/kg	9090	10100	9840	8900	7690	
potassium	7440-09-7	E440	100	mg/kg	5430	5290	4890	5380	4840	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.43	0.31	0.38	0.47	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	----	----	17.8	
silver	7440-22-4	E440	0.10	mg/kg	12.6	20.5	15.0	11.2	----	
sodium	7440-23-5	E440	50	mg/kg	15900	15300	15000	15700	13800	
strontium	7440-24-6	E440	0.50	mg/kg	307	323	355	280	276	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2117-A-1	BA2117-A-2	BA2117-A-3	BA2117-A-4	BA2117-A-5
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-001	VA21A7853-002	VA21A7853-003	VA21A7853-004	VA21A7853-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	13200	14800	13000	12200	11000	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.053	0.068	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	126	167	113	148	3860	
titanium	7440-32-6	E440	1.0	mg/kg	989	732	506	480	1060	
tungsten	7440-33-7	E440	0.50	mg/kg	20.0	31.6	20.0	16.4	13.4	
uranium	7440-61-1	E440	0.050	mg/kg	3.87	4.25	3.90	3.86	3.32	
vanadium	7440-62-2	E440	0.20	mg/kg	51.9	48.7	46.1	43.8	40.3	
zinc	7440-66-6	E440	2.0	mg/kg	5120	8580	13000	5220	5080	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.6	1.6	1.3	1.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.72	9.16	9.01	9.69	9.62	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.22	6.28	6.39	6.23	6.29	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.95	2.04	1.98	2.14	2.13	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.240	0.206	0.259	0.214	0.336	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	2100	2040	1980	1910	
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	0.826	1.11	1.06	0.648	0.586	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.692	0.668	0.963	1.03	0.889	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	146	140	140	149	
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	0.75	0.62	0.57	0.86	
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	BA2117-A-1	BA2117-A-2	BA2117-A-3	BA2117-A-4	BA2117-A-5
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-001	VA21A7853-002	VA21A7853-003	VA21A7853-004	VA21A7853-005	
					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	51.7	45.0	45.3	45.7	42.6	
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	BA2117-A-6	BA2117-A-7	BA2117-A-8	BA2117-A-9	BA2117-A-10
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-006	VA21A7853-007	VA21A7853-008	VA21A7853-009	VA21A7853-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.6	19.8	18.1	19.2	19.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.3	11.3	11.3	11.3	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31600	31800	40500	35200	36000	
antimony	7440-36-0	E440	0.10	mg/kg	146	118	144	125	124	
arsenic	7440-38-2	E440	0.10	mg/kg	26.0	24.1	29.7	25.1	27.0	
barium	7440-39-3	E440	0.50	mg/kg	587	555	665	603	599	
beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.34	0.37	0.35	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	8.29	6.71	7.79	9.29	11.5	
boron	7440-42-8	E440	5.0	mg/kg	172	153	324	186	206	
cadmium	7440-43-9	E440	0.020	mg/kg	12.2	11.1	12.1	10.6	14.8	
calcium	7440-70-2	E440	50	mg/kg	128000	129000	128000	128000	134000	
chromium	7440-47-3	E440	0.50	mg/kg	344	135	152	204	176	
cobalt	7440-48-4	E440	0.10	mg/kg	81.6	27.2	241	75.1	695	
copper	7440-50-8	E440	0.50	mg/kg	3320	2860	2680	7490	3550	
iron	7439-89-6	E440	50	mg/kg	70600	53800	73400	61800	66500	
lead	7439-92-1	E440	0.50	mg/kg	486	437	924	3100	464	
lithium	7439-93-2	E440	2.0	mg/kg	24.2	18.2	26.5	20.3	34.0	
magnesium	7439-95-4	E440	20	mg/kg	12200	13300	11000	11300	11700	
manganese	7439-96-5	E440	1.0	mg/kg	1470	915	1070	873	851	
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	14.8	14.5	34.4	16.9	17.6	
nickel	7440-02-0	E440	0.50	mg/kg	385	200	596	196	169	
phosphorus	7723-14-0	E440	50	mg/kg	8730	8210	8820	8530	8690	
potassium	7440-09-7	E440	100	mg/kg	5230	5000	4850	4700	5240	
selenium	7782-49-2	E440	0.20	mg/kg	0.56	0.30	0.34	0.35	0.32	
silver	7440-22-4	E440.Ag	0.10	mg/kg	15.4	----	17.2	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	11.1	----	12.1	11.5	
sodium	7440-23-5	E440	50	mg/kg	14700	14300	14500	13500	14800	
strontium	7440-24-6	E440	0.50	mg/kg	314	321	327	300	309	
sulfur	7704-34-9	E440	1000	mg/kg	13000	12000	12600	12000	12300	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2117-A-6	BA2117-A-7	BA2117-A-8	BA2117-A-9	BA2117-A-10
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-006	VA21A7853-007	VA21A7853-008	VA21A7853-009	VA21A7853-010	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.054	0.125	0.053	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	125	236	121	132	132	
titanium	7440-32-6	E440	1.0	mg/kg	489	360	880	573	700	
tungsten	7440-33-7	E440	0.50	mg/kg	23.2	19.5	23.6	16.4	24.9	
uranium	7440-61-1	E440	0.050	mg/kg	4.53	3.56	3.73	3.74	3.73	
vanadium	7440-62-2	E440	0.20	mg/kg	52.7	41.2	47.4	45.7	68.6	
zinc	7440-66-6	E440	2.0	mg/kg	4010	3840	4680	3880	4180	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.1	3.2	1.3	1.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.9	11.8	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.28	9.09	9.65	9.30	9.40	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.10	6.23	6.19	6.08	6.18	
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	2.07	2.07	2.00	1.97	1.91	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.282	0.780	0.199	0.196	0.198	
calcium, TCLP	7440-70-2	E444	10	mg/L	2010	2000	1980	2040	1960	
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	0.650	2.03	0.942	0.573	0.896	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.636	1.03	0.415	0.952	0.872	
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	135	134	137	141	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	0.59	0.64	0.46	0.64	0.45	
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	BA2117-A-6	BA2117-A-7	BA2117-A-8	BA2117-A-9	BA2117-A-10
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00	21-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-006	VA21A7853-007	VA21A7853-008	VA21A7853-009	VA21A7853-010	
					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	48.4	50.5	41.9	71.8	45.1	
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					Client sample ID	BA2117-A-11	BA2117-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	21-Apr-2021 09:00	21-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-011	VA21A7853-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	19.3	20.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31800	37600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	135	158	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	28.7	28.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	464	477	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	12.7	9.29	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	218	764	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	12.2	13.2	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	137000	126000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	167	161	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	39.1	46.4	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	3220	2820	----	----	----	
iron	7439-89-6	E440	50	mg/kg	63200	61000	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	990	452	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	20.5	19.5	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	13200	13600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1060	800	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	22.1	18.6	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	174	486	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9090	8200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5380	4910	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.27	----	----	----	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	9.28	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	14.6	----	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14200	14600	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	330	360	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12100	12600	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2117-A-11	BA2117-A-12	----	----	----
Client sampling date / time					21-Apr-2021 09:00	21-Apr-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-011	VA21A7853-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	279	620	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	265	863	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	16.3	20.1	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	3.82	3.70	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	44.2	71.0	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	3790	3870	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	1.0	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.8	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.52	9.14	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.15	6.26	----	----	----	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.98	2.02	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.198	0.248	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1950	2070	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.664	0.871	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.06	0.670	----	----	----	
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	137	146	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.56	0.83	----	----	----	
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	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2117-A-11	BA2117-A-12	----	----	----
					Client sampling date / time	21-Apr-2021 09:00	21-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A7853-011	VA21A7853-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	48.6	54.1	----	----	----	
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	: VA21A7853	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	: 27-Apr-2021 12:15
PO	: VANCO 0000050390	Issue Date	: 06-May-2021 12:10
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	VA21A7853-001	BA2117-A-1	chromium	7440-47-3	E440	36.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	cobalt	7440-48-4	E440	112 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	copper	7440-50-8	E440	36.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	lead	7439-92-1	E440	67.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	lithium	7439-93-2	E440	78.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	manganese	7439-96-5	E440	30.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	nickel	7440-02-0	E440	122 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7853-001	BA2117-A-1	titanium	7440-32-6	E440	108 % DUP-H	40%	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 BA2117-A-12	E440.Ag	21-Apr-2021	03-May-2021	----	13 days	✓	04-May-2021	----	1 days	
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2117-A-5	E440.Ag	21-Apr-2021	03-May-2021	----	13 days	✓	04-May-2021	----	1 days	
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2117-A-6	E440.Ag	21-Apr-2021	03-May-2021	----	13 days	✓	04-May-2021	----	1 days	
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2117-A-8	E440.Ag	21-Apr-2021	03-May-2021	----	13 days	✓	04-May-2021	----	1 days	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2117-A-1	E510	21-Apr-2021	29-Apr-2021	----	9 days	✓	30-Apr-2021	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2117-A-10	E510	21-Apr-2021	29-Apr-2021	----	9 days	✓	30-Apr-2021	28 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2117-A-11	E510	21-Apr-2021	29-Apr-2021	----	9 days	✓	30-Apr-2021	28 days	1 days	✓



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-12	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-2	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-3	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-4	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-5	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-6	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-7	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-8	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2117-A-9	E510	21-Apr-2021	29-Apr-2021	----	9 days	✔	30-Apr-2021	28 days	1 days	✔	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-1	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-10	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-11	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-12	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-2	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-3	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-4	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-5	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2117-A-6	E440	21-Apr-2021	29-Apr-2021	----	9 days	✓	29-Apr-2021	180 days	1 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2117-A-7	E440	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2117-A-8	E440	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2117-A-9	E440	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	180 days	1 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-1	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-10	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-11	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-12	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-2	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2117-A-3	E144	21-Apr-2021	----	----	----		28-Apr-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 BA2117-A-4	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2117-A-5	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2117-A-6	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2117-A-7	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2117-A-8	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2117-A-9	E144	21-Apr-2021	----	----	----		28-Apr-2021	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2117-A-1	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2117-A-10	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2117-A-11	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-12	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-2	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-3	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-4	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-5	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-6	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-7	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-8	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2117-A-9	E108	21-Apr-2021	29-Apr-2021	----	9 days	✔	29-Apr-2021	30 days	1 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-1	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-10	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-11	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-12	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-2	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-3	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-4	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-5	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-6	E512	30-Apr-2021	----	----	----		01-May-2021	----	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)										
HDPE - total (lab preserved) BA2117-A-7	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-8	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2117-A-9	E512	30-Apr-2021	----	----	----		01-May-2021	----	11 days	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-1	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-10	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-11	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-12	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-2	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2117-A-3	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-4	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-5	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-6	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-7	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-8	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2117-A-9	E444	30-Apr-2021	----	----	----		02-May-2021	180 days	12 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-1	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-10	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-11	EPP444	21-Apr-2021	30-Apr-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) BA2117-A-12	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-2	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-3	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-4	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-5	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-6	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-7	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-8	EPP444	21-Apr-2021	30-Apr-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2117-A-9	EPP444	21-Apr-2021	30-Apr-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	186921	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	186922	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	186924	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	186923	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	190272	1	4	25.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	186921	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	186922	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	186924	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	186923	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	190272	1	4	25.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	189131	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	186921	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	189130	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	186922	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	186924	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	189131	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	189130	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.
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
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.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 : VA21A7853

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 : 27-Apr-2021 12:15
Date Analysis Commenced : 28-Apr-2021
Issue Date : 06-May-2021 12:10

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 Ophelia Chiu (Department Manager - Organics) and Robin Weeks (Team Leader - Metals).

Page : 2 of 11
Work Order : VA21A7853
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: 186923)											
VA21A7853-001	BA2117-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.1	0.3%	5%	----
Physical Tests (QC Lot: 186924)											
VA21A7853-001	BA2117-A-1	moisture	----	E144	0.25	%	19.4	19.0	1.96%	20%	----
Metals (QC Lot: 186921)											
VA21A7853-001	BA2117-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0976	0.0476	Diff <2x LOR	----
Metals (QC Lot: 186922)											
VA21A7853-001	BA2117-A-1	aluminum	7429-90-5	E440	50	mg/kg	45900	31900	36.1%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	132	117	11.9%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	28.7	25.5	11.9%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	626	638	1.97%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.39	0.005	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.88	7.38	6.56%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	200	237	16.6%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	13.0	12.0	7.98%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	130000	132000	1.79%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	216	149	36.6%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	117	417	112%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2150	3100	36.2%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	72200	59500	19.2%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	2000	998	67.0%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.9	52.5	78.4%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	12400	13300	6.54%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	852	1160	30.3%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	24.1	16.8	35.8%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	271	1120	122%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	9090	9220	1.43%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5430	4860	11.0%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.32	0.01	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	12.6	12.2	3.89%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15900	15000	5.60%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	307	310	1.04%	40%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 186922) - continued											
VA21A7853-001	BA2117-A-1	sulfur	7704-34-9	E440	1000	mg/kg	13200	12500	5.09%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	126	128	1.69%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	989	295	108%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	20.0	17.8	11.6%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	3.87	3.68	5.13%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	51.9	43.4	17.8%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5120	4430	14.5%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.4	0.03	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: 186924)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 186921)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 186922)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 186922) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 190272)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 189130)						
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	----
TCLP Metals (QCLot: 189131)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



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: 186923)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 186924)									
moisture	----	E144	0.25	%	50 %	99.8	90.0	110	----
Metals (QCLot: 186921)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 186922)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	109	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	117	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	116	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.1	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	111	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	105	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	107	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	107	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	114	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.8	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	114	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	112	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	113	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	108	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	119	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	110	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	106	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	116	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	113	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 186922) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	109	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	107	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	110	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	111	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	109	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	96.7	80.0	120	----
Metals (QCLot: 190272)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	108	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
TCLP Metals (QCLot: 189130)										
VA21A7853-001	BA2117-A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	97.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.0 mg/L	12.5 mg/L	104	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.250 mg/L	0.25 mg/L	99.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.93 mg/L	10 mg/L	99.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.238 mg/L	0.25 mg/L	95.3	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.19 mg/L	1.25 mg/L	95.1	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.30 mg/L	2.5 mg/L	91.9	50.0	140	----
		iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	92.2	50.0	140	----
		lead, TCLP	7439-92-1	E444	6.29 mg/L	10 mg/L	62.9	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	255 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.37 mg/L	2.5 mg/L	95.0	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.00 mg/L	5 mg/L	100	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.116 mg/L	0.1 mg/L	116	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.4	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.99 mg/L	5 mg/L	99.8	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	99.5	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	92.2	70.0	130	----
TCLP Metals (QCLot: 189131)										
VA21A7853-001	BA2117-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	91.8	50.0	140	----



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: 186921)									
QC-186921-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	99.9	70.0	130	----
Metals (QCLot: 186922)									
QC-186922-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	116	70.0	130	----
QC-186922-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
QC-186922-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	112	70.0	130	----
QC-186922-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	124	40.0	160	----
QC-186922-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	118	70.0	130	----
QC-186922-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	119	70.0	130	----
QC-186922-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	112	70.0	130	----
QC-186922-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	111	70.0	130	----
QC-186922-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	110	70.0	130	----
QC-186922-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	116	70.0	130	----
QC-186922-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	116	70.0	130	----
QC-186922-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	115	70.0	130	----
QC-186922-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
QC-186922-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	----
QC-186922-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	120	70.0	130	----
QC-186922-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
QC-186922-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	114	70.0	130	----
QC-186922-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	97.3	40.0	160	----
QC-186922-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	108	70.0	130	----
QC-186922-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	125	70.0	130	----
QC-186922-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-186922-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	116	70.0	130	----

Page : 11 of 11
 Work Order : VA21A7853
 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: 186922) - continued									
QC-186922-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	106	70.0	130	----
QC-186922-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	100	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 Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
		brent.kirkpatrick@metrovancover.org		Analysis Request	
		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 #:		<table border="1"> <tr> <td rowspan="4">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4">MOISTURE</td> <td rowspan="4">Chrome 6</td> <td rowspan="4">MET-CSR-FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="4">Number of Containers</td> </tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)							Number of Containers																		
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)																		Number of Containers																	
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																				
Contact:		LSD: (includes 2:1 pH)																																				
Address:		Quote #:																																				
Phone:		Fax:																																				

Lab Work Order # (lab use only)		7853			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)						
BA2117-A-1		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-2		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-3		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-4		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-5		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-6		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-7		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-8		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-9		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-10		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-11		21-Apr-21	9:00	Soil	X	X		X						
BA2117-A-12		21-Apr-21	9:00	Soil	X	X		X						

Environmental Division
 Vancouver
 Work Order Reference
VA21A7853

Telephone: +1 604 253 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	27-APR-21	9:00				20 °C	<i>[Signature]</i>	APR 27	12:15 PM	GENF 20.00 Front

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