

Bottom Ash Data

2021 Week 40

The following analytical report represents bottom ash composite results for week 39 of 2021 (September 26, 2021 to October 2, 2021).

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

CERTIFICATE OF ANALYSIS

Work Order : **VA21C1990**
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 : 06-Oct-2021 13:00
Date Analysis Commenced : 09-Oct-2021
Issue Date : 21-Oct-2021 23:04

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
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	BA2140-A-1	BA2140-A-2	BA2140-A-3	BA2140-A-4	BA2140-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-001	VA21C1990-002	VA21C1990-003	VA21C1990-004	VA21C1990-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	26.0	24.7	25.5	25.1	24.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.7	10.4	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31300	33000	41000	41400	30500	
antimony	7440-36-0	E440	0.10	mg/kg	142	98.3	112	99.6	92.8	
arsenic	7440-38-2	E440	0.10	mg/kg	20.2	18.1	20.8	18.5	19.9	
barium	7440-39-3	E440	0.50	mg/kg	770	619	529	609	599	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.64	0.37	0.43	0.34	
bismuth	7440-69-9	E440	0.20	mg/kg	8.18	9.29	7.12	9.42	7.52	
boron	7440-42-8	E440	5.0	mg/kg	233	169	181	156	152	
cadmium	7440-43-9	E440	0.020	mg/kg	11.4	8.21	9.59	8.74	8.46	
calcium	7440-70-2	E440	50	mg/kg	137000	128000	141000	135000	127000	
chromium	7440-47-3	E440	0.50	mg/kg	191	230	208	165	193	
cobalt	7440-48-4	E440	0.10	mg/kg	71.3	61.7	128	205	42.8	
copper	7440-50-8	E440	0.50	mg/kg	5450	7170	1640	2170	2290	
iron	7439-89-6	E440	50	mg/kg	49800	60900	49600	83800	62900	
lead	7439-92-1	E440	0.50	mg/kg	1970	1370	561	677	641	
lithium	7439-93-2	E440	2.0	mg/kg	22.7	24.0	22.9	30.2	21.4	
magnesium	7439-95-4	E440	20	mg/kg	12300	10800	12000	13800	10700	
manganese	7439-96-5	E440	1.0	mg/kg	1020	998	4900	867	767	
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	123	54.6	42.2	38.8	31.2	
nickel	7440-02-0	E440	0.50	mg/kg	296	702	209	118	121	
phosphorus	7723-14-0	E440	50	mg/kg	10400	9440	11200	9070	9430	
potassium	7440-09-7	E440	100	mg/kg	4680	4360	5070	4630	4540	
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.41	0.34	0.34	0.44	
silver	7440-22-4	E440.Ag	0.10	mg/kg	5.29	----	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	5.70	4.45	4.61	3.74	
sodium	7440-23-5	E440	50	mg/kg	13700	12500	14700	13500	12500	
strontium	7440-24-6	E440	0.50	mg/kg	294	292	317	294	286	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2140-A-1	BA2140-A-2	BA2140-A-3	BA2140-A-4	BA2140-A-5
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-001	VA21C1990-002	VA21C1990-003	VA21C1990-004	VA21C1990-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	10400	9700	11400	10200	10400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.052	0.068	<0.050	0.050	
tin	7440-31-5	E440	2.0	mg/kg	126	154	86.3	93.9	84.2	
titanium	7440-32-6	E440	1.0	mg/kg	752	444	409	547	344	
tungsten	7440-33-7	E440	0.50	mg/kg	204	10.3	12.5	9.80	8.98	
uranium	7440-61-1	E440	0.050	mg/kg	4.36	3.94	4.33	4.16	4.16	
vanadium	7440-62-2	E440	0.20	mg/kg	45.4	43.3	69.5	47.3	42.8	
zinc	7440-66-6	E440	2.0	mg/kg	4030	4980	10200	3530	4920	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.5	2.9	2.0	1.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.4	11.6	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.59	7.64	8.59	8.79	8.49	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.42	5.97	6.19	6.14	6.20	
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	1.78	1.66	1.89	1.82	1.82	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.135	0.124	0.133	0.123	0.100	
calcium, TCLP	7440-70-2	E444	10	mg/L	1990	1950	2060	2050	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	0.624	0.543	0.740	0.664	2.33	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.676	1.80	1.28	0.688	0.365	
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	120	129	134	127	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.44	0.45	0.59	0.46	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	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2140-A-1	BA2140-A-2	BA2140-A-3	BA2140-A-4	BA2140-A-5
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-001	VA21C1990-002	VA21C1990-003	VA21C1990-004	VA21C1990-005	
					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	20.3	38.0	78.3	23.6	21.2	21.2
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	BA2140-A-6	BA2140-A-7	BA2140-A-8	BA2140-A-9	BA2140-A-10
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-006	VA21C1990-007	VA21C1990-008	VA21C1990-009	VA21C1990-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.5	24.3	25.8	25.3	25.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	10.7	10.6	10.6	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38800	41700	37100	39700	34000	
antimony	7440-36-0	E440	0.10	mg/kg	129	100	121	95.6	98.6	
arsenic	7440-38-2	E440	0.10	mg/kg	19.5	20.5	20.9	19.6	20.3	
barium	7440-39-3	E440	0.50	mg/kg	730	719	682	656	696	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.40	0.75	0.36	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	9.01	8.40	9.17	8.15	8.89	
boron	7440-42-8	E440	5.0	mg/kg	170	180	328	223	173	
cadmium	7440-43-9	E440	0.020	mg/kg	9.88	9.64	9.75	7.92	8.34	
calcium	7440-70-2	E440	50	mg/kg	146000	138000	154000	136000	136000	
chromium	7440-47-3	E440	0.50	mg/kg	270	167	275	161	166	
cobalt	7440-48-4	E440	0.10	mg/kg	89.5	35.8	303	22.4	31.2	
copper	7440-50-8	E440	0.50	mg/kg	3950	9250	4680	1500	3980	
iron	7439-89-6	E440	50	mg/kg	62800	65300	54500	64400	61300	
lead	7439-92-1	E440	0.50	mg/kg	1520	492	1060	3060	612	
lithium	7439-93-2	E440	2.0	mg/kg	24.3	23.7	41.0	22.0	21.6	
magnesium	7439-95-4	E440	20	mg/kg	13300	12700	12600	11500	10600	
manganese	7439-96-5	E440	1.0	mg/kg	882	1610	978	791	793	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.0548	0.127	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	44.5	44.5	89.9	31.6	42.8	
nickel	7440-02-0	E440	0.50	mg/kg	256	154	299	189	142	
phosphorus	7723-14-0	E440	50	mg/kg	11500	10000	13200	9580	10300	
potassium	7440-09-7	E440	100	mg/kg	4900	4680	5320	4320	4440	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.42	0.32	0.27	0.30	
silver	7440-22-4	E440	0.10	mg/kg	4.62	5.08	4.76	8.01	6.03	
sodium	7440-23-5	E440	50	mg/kg	13900	13700	17100	13200	13400	
strontium	7440-24-6	E440	0.50	mg/kg	309	295	352	359	303	
sulfur	7704-34-9	E440	1000	mg/kg	10300	10400	12800	9400	9700	
thallium	7440-28-0	E440	0.050	mg/kg	0.050	0.062	0.056	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2140-A-6	BA2140-A-7	BA2140-A-8	BA2140-A-9	BA2140-A-10
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-006	VA21C1990-007	VA21C1990-008	VA21C1990-009	VA21C1990-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	148	123	153	84.4	85.8	
titanium	7440-32-6	E440	1.0	mg/kg	309	531	285	408	491	
tungsten	7440-33-7	E440	0.50	mg/kg	10.1	14.4	10.4	12.2	10.7	
uranium	7440-61-1	E440	0.050	mg/kg	4.47	4.40	5.22	3.95	4.14	
vanadium	7440-62-2	E440	0.20	mg/kg	47.6	49.3	55.0	43.5	44.7	
zinc	7440-66-6	E440	2.0	mg/kg	3350	5710	4790	3110	2970	
zirconium	7440-67-7	E440	1.0	mg/kg	2.2	1.8	1.6	1.8	1.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.5	11.6	11.4	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.59	8.41	8.86	8.34	8.78	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.32	6.92	6.12	7.01	6.35	
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	1.93	1.65	1.80	1.68	1.92	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.214	0.055	0.137	<0.050	0.118	
calcium, TCLP	7440-70-2	E444	10	mg/L	2070	1760	2000	1750	2110	
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	0.653	0.460	1.32	0.348	0.622	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.28	0.564	1.13	0.543	0.793	
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	126	98.4	122	101	133	
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	0.44	0.35	0.55	<0.25	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	
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	BA2140-A-6	BA2140-A-7	BA2140-A-8	BA2140-A-9	BA2140-A-10
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00	29-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-006	VA21C1990-007	VA21C1990-008	VA21C1990-009	VA21C1990-010	
					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	33.7	4.35	40.0	2.24	24.2	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2140-A-11	BA2140-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	29-Sep-2021 09:00	29-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-011	VA21C1990-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	24.5	25.0	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	39300	45600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	97.1	144	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	16.4	29.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	725	820	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.32	0.62	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	10.2	10.9	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	148	226	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	12.2	9.16	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	130000	160000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	179	186	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	44.9	953	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	4160	4860	----	----	----	
iron	7439-89-6	E440	50	mg/kg	58400	69600	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	2040	2000	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	19.9	33.1	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10900	14400	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	876	851	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	32.4	35.2	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	1310	228	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	8850	12500	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4220	5280	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.42	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.76	7.42	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	13400	15900	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	247	551	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	8000	11900	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.145	0.060	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2140-A-11	BA2140-A-12	----	----	----
Client sampling date / time					29-Sep-2021 09:00	29-Sep-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-011	VA21C1990-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	2480	211	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	447	772	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	8.34	12.5	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	3.79	4.81	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	38.9	54.8	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	11000	4690	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	1.9	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.83	8.83	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.63	6.32	----	----	----	
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	1.66	1.84	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.087	0.121	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1880	2120	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.443	0.508	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.423	0.990	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.33	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	110	135	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.36	0.42	----	----	----	
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	BA2140-A-11	BA2140-A-12	----	----	----
					Client sampling date / time	29-Sep-2021 09:00	29-Sep-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C1990-011	VA21C1990-012	-----	-----	-----	
					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	22.5	28.1	----	----	----	
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	: VA21C1990	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	: 06-Oct-2021 13:00
PO	: VANCO 0000050390	Issue Date	: 21-Oct-2021 23:05
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 Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Metals	QC-MRG2-3229860 01	----	copper	7440-50-8	E440	0.66 ^B mg/kg	0.5 mg/kg	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	vanadium	7440-62-2	E440	30.1 % ^{DUP-H}	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-3229860 02	----	antimony	7440-36-0	E440	121 % ^{MES}	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2140-A-1	E440.Ag	29-Sep-2021	21-Oct-2021	----	----		21-Oct-2021	----	22 days		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-1	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-10	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-11	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-12	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-2	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-3	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 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 BA2140-A-4	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-5	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-6	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-7	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-8	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2140-A-9	E510	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	28 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2140-A-1	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2140-A-10	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2140-A-11	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 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 ICMS											
LDPE bag BA2140-A-12	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-2	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-3	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-4	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-5	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-6	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-7	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-8	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2140-A-9	E440	29-Sep-2021	19-Oct-2021	----	----		20-Oct-2021	180 days	21 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-1	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-10	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-11	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-12	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-2	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-3	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-4	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-5	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2140-A-6	E144	29-Sep-2021	----	----	----		18-Oct-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 BA2140-A-7	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2140-A-8	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2140-A-9	E144	29-Sep-2021	----	----	----		18-Oct-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-1	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-10	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-11	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-12	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-2	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-3	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 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 BA2140-A-4	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-5	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-6	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-7	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-8	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2140-A-9	E108	29-Sep-2021	19-Oct-2021	----	----		19-Oct-2021	30 days	20 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2140-A-1	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2140-A-10	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2140-A-11	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 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) BA2140-A-12	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-2	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-3	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-4	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-5	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-6	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-7	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-8	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2140-A-9	E512	09-Oct-2021	----	----	----		20-Oct-2021	----	21 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) BA2140-A-1	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-10	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-11	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-12	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-2	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-3	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-4	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-5	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2140-A-6	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 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) BA2140-A-7	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2140-A-8	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2140-A-9	E444	09-Oct-2021	----	----	----		20-Oct-2021	180 days	21 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-1	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-10	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-11	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-12	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-2	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-3	EPP444	29-Sep-2021	09-Oct-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) BA2140-A-4	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-5	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-6	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-7	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-8	EPP444	29-Sep-2021	09-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2140-A-9	EPP444	29-Sep-2021	09-Oct-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	322986	1	13	7.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	322987	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	322989	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	322988	1	13	7.6	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	325596	1	4	25.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	322986	2	13	15.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	322987	2	13	15.3	10.0	✔
Moisture Content by Gravimetry	E144	322989	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	322988	1	13	7.6	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	325596	1	4	25.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	324746	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	322986	1	13	7.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	324747	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	322987	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	322989	1	13	7.6	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	324746	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	324747	1	12	8.3	5.0	✔



Methodology References and Summaries

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

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



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



QUALITY CONTROL REPORT

Work Order : VA21C1990

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 : 06-Oct-2021 13:00
Date Analysis Commenced : 09-Oct-2021
Issue Date : 21-Oct-2021 23:05

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

This Quality Control Report contains the following information:

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

Signatories

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

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

Page : 2 of 11
Work Order : VA21C1990
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: 322988)											
VA21C1902-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.44	7.57	1.7%	5%	----
Physical Tests (QC Lot: 322989)											
VA21C1902-001	Anonymous	moisture	----	E144	0.25	%	83.5	83.7	0.252%	20%	----
Metals (QC Lot: 322986)											
VA21C1902-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.677	0.979	36.4%	40%	----
Metals (QC Lot: 322987)											
VA21C1902-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	8090	6610	20.1%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	3.70	3.11	17.1%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	5.26	4.47	16.2%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	308	265	14.9%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.14	0.12	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	63.7	54.7	15.2%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	26.1	21.9	4.2	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	1.93	1.68	14.1%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	20800	17800	15.1%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	48.1	40.5	17.2%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	4.24	3.58	16.8%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	622	533	15.4%	30%	----
		iron	7439-89-6	E440	50	mg/kg	14800	12500	17.4%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	28.4	23.3	19.6%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	2.6	2.2	0.3	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	3720	3240	13.9%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	206	177	15.0%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	10.9	8.99	19.3%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	26.0	21.8	17.3%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	16800	14400	15.9%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	1290	1120	14.4%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	7.63	6.41	17.4%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	3.11	3.59	14.3%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	752	645	15.3%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	106	89.7	16.3%	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: 322987) - continued											
VA21C1902-001	Anonymous	sulfur	7704-34-9	E440	1000	mg/kg	14200	11700	19.3%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.114	0.091	0.023	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	33.9	28.5	17.4%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	63.5	44.8	34.5%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	2.14	1.83	0.31	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.966	0.824	15.8%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	27.1	20.0	30.1%	30%	DUP-H
		zinc	7440-66-6	E440	2.0	mg/kg	1710	1430	18.1%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.2	1.9	0.2	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: 322989)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 322986)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 322987)						
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	# 0.66	B
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: 322987) - 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: 325596)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 324746)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 324747)						
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	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 322988)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 322989)									
moisture	----	E144	0.25	%	50 %	102	90.0	110	----
Metals (QCLot: 322986)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.0	80.0	120	----
Metals (QCLot: 322987)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	113	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	# 121	80.0	120	MES
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	112	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	115	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	109	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	116	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.4	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	109	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	113	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	112	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	112	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	105	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	115	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	110	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	113	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	110	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	114	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	110	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	120	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	115	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	113	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	108	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	113	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	112	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Metals (QCLot: 322987) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	117	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	109	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	112	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	112	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	107	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	110	80.0	120	----
Metals (QCLot: 325596)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	104	80.0	120	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 324746)										
VA21C1990-001	BA2140-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.8	50.0	140	----
TCLP Metals (QCLot: 324747)										
VA21C1990-001	BA2140-A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.3	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.3 mg/L	12.5 mg/L	106	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.232 mg/L	0.25 mg/L	92.7	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.46 mg/L	10 mg/L	84.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.227 mg/L	0.25 mg/L	91.0	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	1.17 mg/L	1.25 mg/L	93.5	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	2.20 mg/L	2.5 mg/L	88.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	231 mg/L	250 mg/L	92.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	246 mg/L	250 mg/L	98.3	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.28 mg/L	2.5 mg/L	91.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.92 mg/L	5 mg/L	98.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.099 mg/L	0.1 mg/L	99.2	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	99.9	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.06 mg/L	5 mg/L	101	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.8	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	89.7	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix: **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: 322986)									
QC-322986-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.9	70.0	130	----
Metals (QCLot: 322987)									
QC-322987-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
QC-322987-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	101	70.0	130	----
QC-322987-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	96.5	70.0	130	----
QC-322987-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
QC-322987-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
QC-322987-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	103	40.0	160	----
QC-322987-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	92.4	70.0	130	----
QC-322987-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	107	70.0	130	----
QC-322987-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	102	70.0	130	----
QC-322987-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	98.3	70.0	130	----
QC-322987-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	90.3	70.0	130	----
QC-322987-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	98.3	70.0	130	----
QC-322987-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	----
QC-322987-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	104	70.0	130	----
QC-322987-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	100	70.0	130	----
QC-322987-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
QC-322987-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
QC-322987-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	98.6	70.0	130	----
QC-322987-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	97.2	70.0	130	----
QC-322987-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
QC-322987-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	99.9	70.0	130	----
QC-322987-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
QC-322987-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	92.3	40.0	160	----
QC-322987-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	94.9	70.0	130	----
QC-322987-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	101	70.0	130	----
QC-322987-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-322987-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	100	70.0	130	----



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: 322987) - continued									
QC-322987-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	93.9	70.0	130	----
QC-322987-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	94.9	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form
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COC # _____

Page ____ of ____

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Bumaby 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		
			Sarah.Wellman@metrovancover.org		

Invoice To Same as Report ?		Client / Project Information		Analysis Request							
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:		Please indicate below Filtered, Preserved or both (F, P, F/P)							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite		MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)				Number of Containers
Contact:		LSD: (includes 2:1 pH)									
Address:		Quote #:									
Phone:		Fax:									

Lab Work Order # (lab use only)		1990			ALS Contact:	Sampler:																
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)														Number of Containers
1	BA2140-A-1	29-Sep-21	9:00	Soil	X	X		X														1
2	BA2140-A-2	29-Sep-21	9:00	Soil	X	X		X														1
3	BA2140-A-3	29-Sep-21	9:00	Soil	X	X		X														1
4	BA2140-A-4	29-Sep-21	9:00	Soil	X	X		X														1
5	BA2140-A-5	29-Sep-21	9:00	Soil	X	X		X														1
6	BA2140-A-6	29-Sep-21	9:00	Soil	X	X		X														1
7	BA2140-A-7	29-Sep-21	9:00	Soil	X	X		X														1
8	BA2140-A-8	29-Sep-21	9:00	Soil	X	X		X														1
9	BA2140-A-9	29-Sep-21	9:00	Soil	X	X		X														1
10	BA2140-A-10	29-Sep-21	9:00	Soil	X	X		X														1
11	BA2140-A-11	29-Sep-21	9:00	Soil	X	X		X														1
12	BA2140-A-12	29-Sep-21	9:00	Soil	X	X		X														1

Environmental Division
Vancouver
Work Order Reference
VA21C1990



Telephone : +1 604 263 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:
<i>[Signature]</i>	5 OCT 21	0800				18/18°C	<i>[Signature]</i>	02/02/21	1pm	Yes / No ? If Yes add SIF

2 buckets