

Bottom Ash Data

2021 Week 46

The following analytical report represents bottom ash composite results for week 46 of 2021 (November 7, 2021 to November 13, 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 : **VA21C5576**
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 : 16-Nov-2021 12:50
Date Analysis Commenced : 19-Nov-2021
Issue Date : 26-Nov-2021 15:25

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Woochan Song	Lab Analyst	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2146-A-1	BA2146-A-2	BA2146-A-3	BA2146-A-4	BA2146-A-5
(Matrix: Soil/Solid)					Client sampling date / time	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-001	VA21C5576-002	VA21C5576-003	VA21C5576-004	VA21C5576-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.6	22.1	23.0	21.5	20.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.6	11.5	11.4	11.4	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36900	37200	38400	59400	40400	
antimony	7440-36-0	E440	0.10	mg/kg	75.4	82.2	86.1	75.1	97.0	
arsenic	7440-38-2	E440	0.10	mg/kg	18.2	14.6	22.2	11.9	15.1	
barium	7440-39-3	E440	0.50	mg/kg	680	614	617	681	771	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.43	0.37	0.52	0.41	
bismuth	7440-69-9	E440	0.20	mg/kg	7.73	5.05	6.52	6.03	4.22	
boron	7440-42-8	E440	5.0	mg/kg	259	241	244	216	369	
cadmium	7440-43-9	E440	0.020	mg/kg	8.91	15.2	9.09	11.0	7.12	
calcium	7440-70-2	E440	50	mg/kg	134000	135000	141000	144000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	141	107	182	176	176	
cobalt	7440-48-4	E440	0.10	mg/kg	48.5	23.1	49.8	33.2	1950	
copper	7440-50-8	E440	0.50	mg/kg	1600	1300	1700	1420	1470	
iron	7439-89-6	E440	50	mg/kg	76400	55200	49600	48300	41600	
lead	7439-92-1	E440	0.50	mg/kg	370	470	1460	816	476	
lithium	7439-93-2	E440	2.0	mg/kg	19.2	22.3	28.5	33.4	31.0	
magnesium	7439-95-4	E440	20	mg/kg	12000	10600	12800	11600	10800	
manganese	7439-96-5	E440	1.0	mg/kg	777	735	812	898	782	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.128	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.0	19.3	26.2	23.5	22.8	
nickel	7440-02-0	E440	0.50	mg/kg	95.1	79.4	147	123	119	
phosphorus	7723-14-0	E440	50	mg/kg	12400	13900	12800	13600	13400	
potassium	7440-09-7	E440	100	mg/kg	3890	4330	4430	4240	4360	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.28	0.25	0.24	<0.20	
silver	7440-22-4	E440	0.10	mg/kg	3.26	7.16	6.43	12.0	4.08	
sodium	7440-23-5	E440	50	mg/kg	14000	14100	13400	13900	14400	
strontium	7440-24-6	E440	0.50	mg/kg	547	381	331	339	343	
sulfur	7704-34-9	E440	1000	mg/kg	8100	8300	8600	8100	7800	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2146-A-1	BA2146-A-2	BA2146-A-3	BA2146-A-4	BA2146-A-5
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-001	VA21C5576-002	VA21C5576-003	VA21C5576-004	VA21C5576-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.069	0.072	0.070	0.074	0.066	
tin	7440-31-5	E440	2.0	mg/kg	83.1	73.3	162	107	83.7	
titanium	7440-32-6	E440	1.0	mg/kg	446	359	307	626	273	
tungsten	7440-33-7	E440	0.50	mg/kg	22.9	16.0	25.6	19.4	15.6	
uranium	7440-61-1	E440	0.050	mg/kg	5.36	5.13	5.30	5.47	4.95	
vanadium	7440-62-2	E440	0.20	mg/kg	46.1	46.9	48.3	49.1	48.4	
zinc	7440-66-6	E440	2.0	mg/kg	2750	3160	2950	4150	3700	
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	2.5	2.8	3.5	2.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.0	11.9	11.8	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.42	9.39	9.52	8.50	9.66	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.13	6.15	6.24	6.18	6.24	
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	1.65	1.65	1.66	1.80	1.74	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.118	0.148	0.119	0.109	1.00	
calcium, TCLP	7440-70-2	E444	10	mg/L	1830	1860	1820	1880	1900	
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	3.30	0.925	0.808	0.818	0.935	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.869	0.832	0.783	0.754	0.954	
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	1.19	<0.25	<0.25	<0.25	0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	131	132	130	135	134	
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	0.46	0.55	0.49	0.43	0.50	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2146-A-1	BA2146-A-2	BA2146-A-3	BA2146-A-4	BA2146-A-5
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-001	VA21C5576-002	VA21C5576-003	VA21C5576-004	VA21C5576-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	40.7	31.0	29.3	37.7	32.8	32.8
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	BA2146-A-6	BA2146-A-7	BA2146-A-8	BA2146-A-9	BA2146-A-10
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-006	VA21C5576-007	VA21C5576-008	VA21C5576-009	VA21C5576-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.8	21.0	22.6	23.0	23.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.5	11.6	11.4	11.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37000	43900	37200	66200	34700	
antimony	7440-36-0	E440	0.10	mg/kg	70.4	97.7	88.8	224	86.0	
arsenic	7440-38-2	E440	0.10	mg/kg	12.9	26.5	15.4	15.5	13.6	
barium	7440-39-3	E440	0.50	mg/kg	616	740	729	636	630	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.42	0.57	0.50	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	5.47	107	4.97	3.94	5.99	
boron	7440-42-8	E440	5.0	mg/kg	188	240	236	277	252	
cadmium	7440-43-9	E440	0.020	mg/kg	7.96	8.63	6.95	7.12	10.2	
calcium	7440-70-2	E440	50	mg/kg	117000	135000	124000	124000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	185	132	125	114	139	
cobalt	7440-48-4	E440	0.10	mg/kg	24.3	134	21.0	44.2	37.3	
copper	7440-50-8	E440	0.50	mg/kg	2340	12000	4230	1550	3830	
iron	7439-89-6	E440	50	mg/kg	81300	53100	48800	48700	63200	
lead	7439-92-1	E440	0.50	mg/kg	439	518	394	2280	472	
lithium	7439-93-2	E440	2.0	mg/kg	19.2	40.9	21.3	23.5	24.8	
magnesium	7439-95-4	E440	20	mg/kg	10300	12400	10400	12200	12000	
manganese	7439-96-5	E440	1.0	mg/kg	853	790	818	1050	769	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0560	<0.0500	0.103	0.0566	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.9	21.5	20.4	117	24.4	
nickel	7440-02-0	E440	0.50	mg/kg	117	107	162	172	239	
phosphorus	7723-14-0	E440	50	mg/kg	11000	11900	11500	11700	12800	
potassium	7440-09-7	E440	100	mg/kg	4020	4470	4430	4380	4180	
selenium	7782-49-2	E440	0.20	mg/kg	0.21	0.21	0.26	0.33	0.25	
silver	7440-22-4	E440	0.10	mg/kg	6.69	4.41	9.02	6.46	3.07	
sodium	7440-23-5	E440	50	mg/kg	12200	14600	13800	13800	13200	
strontium	7440-24-6	E440	0.50	mg/kg	317	312	358	372	370	
sulfur	7704-34-9	E440	1000	mg/kg	8400	8400	8500	8900	7600	
thallium	7440-28-0	E440	0.050	mg/kg	0.080	0.072	0.093	0.067	0.058	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2146-A-6	BA2146-A-7	BA2146-A-8	BA2146-A-9	BA2146-A-10
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-006	VA21C5576-007	VA21C5576-008	VA21C5576-009	VA21C5576-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	139	152	326	90.0	78.6	
titanium	7440-32-6	E440	1.0	mg/kg	377	364	533	1420	376	
tungsten	7440-33-7	E440	0.50	mg/kg	18.8	16.8	20.3	183	15.9	
uranium	7440-61-1	E440	0.050	mg/kg	4.74	5.18	5.04	4.73	4.62	
vanadium	7440-62-2	E440	0.20	mg/kg	44.1	56.7	49.6	54.4	49.1	
zinc	7440-66-6	E440	2.0	mg/kg	3780	3180	7890	4210	3780	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.2	1.6	8.6	2.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.9	12.0	12.0	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.93	9.54	9.23	9.65	9.32	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.15	6.30	6.13	6.09	6.15	
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	1.69	1.74	1.70	1.75	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.280	0.104	0.130	0.112	0.141	
calcium, TCLP	7440-70-2	E444	10	mg/L	1910	1860	1930	1880	1900	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.03	1.09	0.626	0.892	0.633	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.927	0.597	1.15	0.741	0.955	
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	0.98	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	139	130	137	135	134	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.48	0.42	0.44	0.49	0.54	
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	BA2146-A-6	BA2146-A-7	BA2146-A-8	BA2146-A-9	BA2146-A-10
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00	10-Nov-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-006	VA21C5576-007	VA21C5576-008	VA21C5576-009	VA21C5576-010	
					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	26.1	32.8	36.2	35.3	26.9	26.9
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		BA2146-A-11	BA2146-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		10-Nov-2021 09:00	10-Nov-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-011	VA21C5576-012	-----	-----	-----		
					Result	Result	---	---	---		
Physical Tests											
moisture	----	E144	0.25	%	23.2	22.6	----	----	----		
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.7	----	----	----		
Metals											
aluminum	7429-90-5	E440	50	mg/kg	38200	49600	----	----	----		
antimony	7440-36-0	E440	0.10	mg/kg	90.7	80.4	----	----	----		
arsenic	7440-38-2	E440	0.10	mg/kg	24.3	14.0	----	----	----		
barium	7440-39-3	E440	0.50	mg/kg	640	769	----	----	----		
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	----	----	----		
bismuth	7440-69-9	E440	0.20	mg/kg	5.55	4.80	----	----	----		
boron	7440-42-8	E440	5.0	mg/kg	220	210	----	----	----		
cadmium	7440-43-9	E440	0.020	mg/kg	7.48	10.1	----	----	----		
calcium	7440-70-2	E440	50	mg/kg	137000	135000	----	----	----		
chromium	7440-47-3	E440	0.50	mg/kg	196	134	----	----	----		
cobalt	7440-48-4	E440	0.10	mg/kg	24.6	74.6	----	----	----		
copper	7440-50-8	E440	0.50	mg/kg	2760	2620	----	----	----		
iron	7439-89-6	E440	50	mg/kg	59100	56000	----	----	----		
lead	7439-92-1	E440	0.50	mg/kg	443	1060	----	----	----		
lithium	7439-93-2	E440	2.0	mg/kg	20.9	20.4	----	----	----		
magnesium	7439-95-4	E440	20	mg/kg	12200	13300	----	----	----		
manganese	7439-96-5	E440	1.0	mg/kg	748	1100	----	----	----		
mercury	7439-97-6	E510	0.0500	mg/kg	0.0564	<0.0500	----	----	----		
molybdenum	7439-98-7	E440	0.10	mg/kg	35.1	27.8	----	----	----		
nickel	7440-02-0	E440	0.50	mg/kg	234	218	----	----	----		
phosphorus	7723-14-0	E440	50	mg/kg	13600	13700	----	----	----		
potassium	7440-09-7	E440	100	mg/kg	4510	4360	----	----	----		
selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.30	----	----	----		
silver	7440-22-4	E440	0.10	mg/kg	3.62	4.79	----	----	----		
sodium	7440-23-5	E440	50	mg/kg	14400	13500	----	----	----		
strontium	7440-24-6	E440	0.50	mg/kg	395	376	----	----	----		
sulfur	7704-34-9	E440	1000	mg/kg	8500	8500	----	----	----		
thallium	7440-28-0	E440	0.050	mg/kg	0.069	0.069	----	----	----		



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2146-A-11	BA2146-A-12	----	----	----
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-011	VA21C5576-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	74.1	108	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	365	774	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	19.4	24.7	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.98	4.99	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	45.9	49.6	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	2880	3600	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	2.3	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.12	9.34	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.15	6.23	---	---	---	
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	1.74	1.74	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.190	0.254	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1880	1860	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.34	0.752	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.30	0.764	---	---	---	
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	0.45	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	133	134	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.73	0.56	---	---	---	
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	BA2146-A-11	BA2146-A-12	----	----	----
Client sampling date / time					10-Nov-2021 09:00	10-Nov-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C5576-011	VA21C5576-012	-----	-----	-----	
					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	39.9	35.4	----	----	----	
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	: VA21C5576	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	: 16-Nov-2021 12:50
PO	: VANCO 0000050390	Issue Date	: 26-Nov-2021 15:25
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	VA21C5576-001	BA2146-A-1	antimony	7440-36-0	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	arsenic	7440-38-2	E440	33.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	bismuth	7440-69-9	E440	58.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	boron	7440-42-8	E440	33.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	cadmium	7440-43-9	E440	31.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	cobalt	7440-48-4	E440	34.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	iron	7439-89-6	E440	31.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	strontium	7440-24-6	E440	53.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	tungsten	7440-33-7	E440	30.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21C5576-001	BA2146-A-1	zinc	7440-66-6	E440	81.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-1	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-10	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-11	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-12	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-2	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-3	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-4	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-5	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-6	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-7	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-8	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2146-A-9	E510	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	28 days	14 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2146-A-1	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2146-A-10	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2146-A-11	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✓	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2146-A-12	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-2	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-3	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-4	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-5	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-6	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-7	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-8	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2146-A-9	E440	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	180 days	14 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2146-A-1	E144	10-Nov-2021	----	----	----		21-Nov-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 BA2146-A-10	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-11	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-12	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-2	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-3	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-4	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-5	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-6	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2146-A-7	E144	10-Nov-2021	----	----	----		21-Nov-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 BA2146-A-8	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2146-A-9	E144	10-Nov-2021	----	----	----		21-Nov-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-1	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-10	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-11	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-12	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-2	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-3	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-4	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-5	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-6	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-7	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-8	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2146-A-9	E108	10-Nov-2021	23-Nov-2021	----	----		23-Nov-2021	30 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2146-A-1	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2146-A-10	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2146-A-11	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2146-A-12	E512	19-Nov-2021	----	----	----		21-Nov-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) BA2146-A-2	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-3	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-4	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-5	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-6	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-7	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-8	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2146-A-9	E512	19-Nov-2021	----	----	----		21-Nov-2021	----	11 days	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2146-A-1	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-10	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-11	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-12	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-2	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-3	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-4	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-5	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-6	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2146-A-7	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2146-A-8	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2146-A-9	E444	19-Nov-2021	----	----	----		21-Nov-2021	180 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-1	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-10	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-11	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-12	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-2	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-3	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-4	EPP444	10-Nov-2021	19-Nov-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) BA2146-A-5	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-6	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-7	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-8	EPP444	10-Nov-2021	19-Nov-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2146-A-9	EPP444	10-Nov-2021	19-Nov-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	349581	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	349580	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	349583	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	349582	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	349581	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	349580	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	349583	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	349582	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	349522	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	349581	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	349523	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	349580	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	349583	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	349522	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	349523	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.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.

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Work Order : VA21C5576
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA21C5576

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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 : 16-Nov-2021 12:50
Date Analysis Commenced : 19-Nov-2021
Issue Date : 26-Nov-2021 15:25

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Angela Ren (Team Leader - Metals), Caleb Deroche (Lab Analyst), Kevin Duarte (Supervisor - Metals ICP Instrumentation), Kim Jensen (Department Manager - Metals), Rebecca Sit (Supervisor - Organics Extractions), and Woonchan Song (Lab Analyst).

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Work Order : VA21C5576
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: 349582)											
VA21C5576-001	BA2146-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.6	0.9%	5%	----
Physical Tests (QC Lot: 349583)											
VA21C5576-001	BA2146-A-1	moisture	----	E144	0.25	%	24.6	24.5	0.492%	20%	----
Metals (QC Lot: 349580)											
VA21C5576-001	BA2146-A-1	aluminum	7429-90-5	E440	50	mg/kg	36900	48700	27.7%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	75.4	103	30.8%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	18.2	13.0	33.3%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	680	611	10.7%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.45	0.08	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.73	4.24	58.4%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	259	184	33.9%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	8.91	6.50	31.3%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	134000	135000	1.04%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	141	114	21.2%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	48.5	34.2	34.3%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1600	1290	22.0%	30%	----
		iron	7439-89-6	E440	50	mg/kg	76400	55500	31.7%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	370	495	28.9%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	19.2	20.8	7.88%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12000	11800	0.971%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	777	898	14.4%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	21.0	25.7	20.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	95.1	89.6	5.97%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	12400	12600	1.90%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	3890	4200	7.70%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.24	0.10	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	3.26	4.39	29.4%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14000	14200	1.22%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	547	316	53.5%	40%	DUP-H
		sulfur	7704-34-9	E440	1000	mg/kg	8100	7400	8.26%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.069	0.062	0.007	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 349580) - continued											
VA21C5576-001	BA2146-A-1	tin	7440-31-5	E440	2.0	mg/kg	83.1	98.5	17.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	446	462	3.51%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	22.9	16.9	30.1%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	5.36	4.80	11.2%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	46.1	47.0	1.85%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	2750	6550	81.6%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.9	2.8	1.0	Diff <2x LOR	----
Metals (QC Lot: 349581)											
VA21C5576-001	BA2146-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 349583)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 349580)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 349580) - continued						
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 349581)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 349522)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 349523)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 349582)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.5	95.0	105	---
Physical Tests (QCLot: 349583)									
moisture	---	E144	0.25	%	50 %	99.4	90.0	110	---
Metals (QCLot: 349580)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.8	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.2	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.7	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	98.2	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.1	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.4	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	101	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	95.6	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.4	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.1	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.2	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.2	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.1	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	108	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.4	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.4	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.4	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.2	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.9	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.6	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.4	80.0	120	---



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 349580) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.6	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.4	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.4	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	97.5	80.0	120	----
Metals (QCLot: 349581)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	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: 349522)										
VA21C5576-001	BA2146-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	92.8	50.0	140	----
TCLP Metals (QCLot: 349523)										
VA21C5576-001	BA2146-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	4.6 mg/L	5 mg/L	93.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.3 mg/L	12.5 mg/L	98.8	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.226 mg/L	0.25 mg/L	90.5	50.0	140	----
		boron, TCLP	7440-42-8	E444	7.95 mg/L	10 mg/L	79.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.231 mg/L	0.25 mg/L	92.5	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	1.15 mg/L	1.25 mg/L	91.8	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	2.23 mg/L	2.5 mg/L	89.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	229 mg/L	250 mg/L	91.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.2	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.24 mg/L	2.5 mg/L	89.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.85 mg/L	5 mg/L	96.9	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.098 mg/L	0.1 mg/L	98.1	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.80 mg/L	5 mg/L	95.9	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.69 mg/L	0.75 mg/L	92.6	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	88.4	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: 349580)									
QC-349580-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	110	70.0	130	----
QC-349580-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
QC-349580-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	115	70.0	130	----
QC-349580-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	106	70.0	130	----
QC-349580-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	118	70.0	130	----
QC-349580-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	128	40.0	160	----
QC-349580-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	99.2	70.0	130	----
QC-349580-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	----
QC-349580-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
QC-349580-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-349580-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	108	70.0	130	----
QC-349580-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	107	70.0	130	----
QC-349580-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	----
QC-349580-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	109	70.0	130	----
QC-349580-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-349580-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	111	70.0	130	----
QC-349580-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	106	70.0	130	----
QC-349580-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-349580-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	110	70.0	130	----
QC-349580-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
QC-349580-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
QC-349580-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
QC-349580-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
QC-349580-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
QC-349580-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	112	70.0	130	----
QC-349580-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-349580-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----
QC-349580-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	105	70.0	130	----
QC-349580-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	98.5	70.0	130	----

Page : 11 of 11
 Work Order : VA21C5576
 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: 349581)									
QC-349581-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.7	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:	riohanson4@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:		ALS Contact:											

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
BA2146-A-1		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-2		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-3		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-4		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-5		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-6		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-7		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-8		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-9		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-10		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-11		10-Nov-21	9:00	Soil	X	X		X						1
BA2146-A-12		10-Nov-21	9:00	Soil	X	X		X						1

Environmental Division
 Vancouver
 Work Order Reference
VA21C5576

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)			Observations:	
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Yes / No ? If Yes add SIF
KI	15/11/2021	13:45				20° C	JN	Nov 16/	12:50 pm	GENF 20.00 Front