

Bottom Ash Data

2021 Week 49

The following analytical report represents bottom ash composite results for week 49 of 2021 (November 28, 2021 to December 4, 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 : **VA21C7234**
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 : 07-Dec-2021 12:30
Date Analysis Commenced : 09-Dec-2021
Issue Date : 22-Dec-2021 12:20

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
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	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	BA2149-A-1	BA2149-A-2	BA2149-A-3	BA2149-A-4	BA2149-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-001	VA21C7234-002	VA21C7234-003	VA21C7234-004	VA21C7234-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	23.3	23.8	25.1	26.2	25.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	10.6	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	43800	36900	39900	39800	32200	
antimony	7440-36-0	E440	0.10	mg/kg	155	140	142	116	128	
arsenic	7440-38-2	E440	0.10	mg/kg	19.0	16.2	19.4	16.6	18.0	
barium	7440-39-3	E440	0.50	mg/kg	406	405	417	366	496	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.38	0.39	0.36	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	21.2	7.02	7.78	7.91	8.23	
boron	7440-42-8	E440	5.0	mg/kg	180	200	244	163	200	
cadmium	7440-43-9	E440	0.020	mg/kg	20.5	11.3	12.2	10.8	12.7	
calcium	7440-70-2	E440	50	mg/kg	139000	136000	142000	135000	146000	
chromium	7440-47-3	E440	0.50	mg/kg	143	116	144	128	140	
cobalt	7440-48-4	E440	0.10	mg/kg	44.7	38.6	36.8	42.8	24.2	
copper	7440-50-8	E440	0.50	mg/kg	4040	1940	5430	3720	1670	
iron	7439-89-6	E440	50	mg/kg	50500	38800	47400	34500	53100	
lead	7439-92-1	E440	0.50	mg/kg	473	332	430	370	631	
lithium	7439-93-2	E440	2.0	mg/kg	22.1	23.9	20.9	20.8	23.1	
magnesium	7439-95-4	E440	20	mg/kg	12100	11800	11100	10900	13700	
manganese	7439-96-5	E440	1.0	mg/kg	736	603	783	836	988	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0898	0.0973	0.107	0.197	0.130	
molybdenum	7439-98-7	E440	0.10	mg/kg	22.6	22.7	19.3	17.2	19.6	
nickel	7440-02-0	E440	0.50	mg/kg	102	209	210	106	120	
phosphorus	7723-14-0	E440	50	mg/kg	12800	10400	11600	11300	11500	
potassium	7440-09-7	E440	100	mg/kg	5790	4990	6000	5720	5460	
selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.25	0.36	0.35	0.37	
silver	7440-22-4	E440	0.10	mg/kg	5.00	4.29	5.79	3.79	4.56	
sodium	7440-23-5	E440	50	mg/kg	15400	14900	15800	15700	15800	
strontium	7440-24-6	E440	0.50	mg/kg	441	317	324	327	337	
sulfur	7704-34-9	E440	1000	mg/kg	12900	12100	13600	13100	12500	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2149-A-1	BA2149-A-2	BA2149-A-3	BA2149-A-4	BA2149-A-5
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-001	VA21C7234-002	VA21C7234-003	VA21C7234-004	VA21C7234-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.058	0.071	0.064	0.072	
tin	7440-31-5	E440	2.0	mg/kg	90.6	98.4	177	887	319	
titanium	7440-32-6	E440	1.0	mg/kg	400	346	402	259	223	
tungsten	7440-33-7	E440	0.50	mg/kg	12.1	5.59	15.5	7.37	7.08	
uranium	7440-61-1	E440	0.050	mg/kg	5.32	4.81	5.05	5.37	5.16	
vanadium	7440-62-2	E440	0.20	mg/kg	49.0	44.2	47.2	45.6	48.2	
zinc	7440-66-6	E440	2.0	mg/kg	3750	3120	3390	3540	5210	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	1.9	2.4	3.7	2.1	
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.65	----	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	11.6	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.06	8.71	9.21	8.81	8.95	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.84	2.84	2.84	2.84	2.84	
pH, TCLP final	----	EPP444	0.010	pH units	6.31	6.25	6.19	6.40	6.45	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.66	1.86	1.87	2.01	2.18	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.168	0.169	0.278	0.157	0.498	
calcium, TCLP	7440-70-2	E444	10	mg/L	2030	2000	1880	2040	2010	
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	0.736	1.36	0.891	1.24	0.737	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.91	1.13	4.29	1.12	1.18	
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	149	155	130	157	153	
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	0.38	0.53	0.48	0.36	0.36	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2149-A-1	BA2149-A-2	BA2149-A-3	BA2149-A-4	BA2149-A-5
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-001	VA21C7234-002	VA21C7234-003	VA21C7234-004	VA21C7234-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<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	<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	65.8	32.2	45.9	52.1	34.3	
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	BA2149-A-6	BA2149-A-7	BA2149-A-8	BA2149-A-9	BA2149-A-10
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-006	VA21C7234-007	VA21C7234-008	VA21C7234-009	VA21C7234-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.6	25.3	26.0	26.4	25.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	10.5	10.6	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	44100	37800	38600	42600	44300	
antimony	7440-36-0	E440	0.10	mg/kg	137	117	103	114	216	
arsenic	7440-38-2	E440	0.10	mg/kg	19.6	16.3	17.8	15.8	20.2	
barium	7440-39-3	E440	0.50	mg/kg	478	441	322	400	461	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.34	0.32	0.36	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	9.07	9.48	6.54	9.71	8.86	
boron	7440-42-8	E440	5.0	mg/kg	230	222	161	195	431	
cadmium	7440-43-9	E440	0.020	mg/kg	12.2	15.8	10.3	15.2	14.7	
calcium	7440-70-2	E440	50	mg/kg	149000	134000	123000	134000	140000	
chromium	7440-47-3	E440	0.50	mg/kg	152	104	131	122	165	
cobalt	7440-48-4	E440	0.10	mg/kg	680	28.7	198	25.3	22.4	
copper	7440-50-8	E440	0.50	mg/kg	8730	1390	10600	1920	14200	
iron	7439-89-6	E440	50	mg/kg	61900	38900	58000	39800	91400	
lead	7439-92-1	E440	0.50	mg/kg	514	369	3770	389	765	
lithium	7439-93-2	E440	2.0	mg/kg	29.4	18.2	21.5	19.6	21.4	
magnesium	7439-95-4	E440	20	mg/kg	13300	12800	11900	11700	13100	
manganese	7439-96-5	E440	1.0	mg/kg	1150	611	751	706	1040	
mercury	7439-97-6	E510	0.0500	mg/kg	0.176	0.151	14.4	0.109	0.102	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.1	21.2	16.8	19.5	21.5	
nickel	7440-02-0	E440	0.50	mg/kg	120	215	188	78.8	125	
phosphorus	7723-14-0	E440	50	mg/kg	11600	10700	9540	11200	10500	
potassium	7440-09-7	E440	100	mg/kg	5640	5580	4360	5270	6060	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.52	0.34	0.37	0.34	
silver	7440-22-4	E440	0.10	mg/kg	9.23	4.67	4.72	5.09	4.98	
sodium	7440-23-5	E440	50	mg/kg	17000	14500	12500	15100	16800	
strontium	7440-24-6	E440	0.50	mg/kg	344	325	289	363	318	
sulfur	7704-34-9	E440	1000	mg/kg	12100	12100	10700	11100	12600	
thallium	7440-28-0	E440	0.050	mg/kg	0.094	0.066	0.107	0.063	0.066	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2149-A-6	BA2149-A-7	BA2149-A-8	BA2149-A-9	BA2149-A-10
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-006	VA21C7234-007	VA21C7234-008	VA21C7234-009	VA21C7234-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	167	120	255	88.8	241	
titanium	7440-32-6	E440	1.0	mg/kg	314	302	224	299	407	
tungsten	7440-33-7	E440	0.50	mg/kg	7.48	9.02	7.16	6.32	7.05	
uranium	7440-61-1	E440	0.050	mg/kg	5.63	4.79	4.40	4.43	4.92	
vanadium	7440-62-2	E440	0.20	mg/kg	51.1	45.4	44.8	42.8	59.7	
zinc	7440-66-6	E440	2.0	mg/kg	4820	3130	4400	2860	4880	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	2.4	3.0	4.8	2.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.7	11.7	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.17	8.87	9.04	9.28	9.10	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.84	2.84	2.84	2.84	2.84	
pH, TCLP final	----	EPP444	0.010	pH units	6.34	6.55	6.32	6.27	6.36	
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	1.84	2.01	1.91	1.88	1.94	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.285	0.146	0.169	0.227	0.164	
calcium, TCLP	7440-70-2	E444	10	mg/L	1950	1980	1970	2030	2010	
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	0.671	0.942	0.750	0.893	1.05	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.897	0.743	0.778	0.937	0.963	
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	0.42	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	152	158	141	164	140	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.34	0.36	0.34	0.35	0.37	
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	BA2149-A-6	BA2149-A-7	BA2149-A-8	BA2149-A-9	BA2149-A-10
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00	01-Dec-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-006	VA21C7234-007	VA21C7234-008	VA21C7234-009	VA21C7234-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	32.2	26.5	34.1	33.2	38.5	
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 (Matrix: Soil/Solid)					Client sample ID	BA2149-A-11	BA2149-A-12	----	----	----
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-011	VA21C7234-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	24.5	24.0	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	39400	29600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	117	109	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	17.5	18.2	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	410	412	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.55	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	7.12	6.69	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	232	156	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	11.5	12.0	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	147000	134000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	143	144	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	25.3	39.2	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	8630	3050	----	----	----	
iron	7439-89-6	E440	50	mg/kg	63700	57800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	544	350	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	29.0	17.8	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11700	12300	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	3030	797	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.127	0.161	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.8	76.7	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	126	95.1	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	12100	11000	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5520	5360	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.26	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.93	13.1	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15200	14600	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	897	322	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12300	10200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.053	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2149-A-11	BA2149-A-12	----	----	----
Client sampling date / time					01-Dec-2021 09:00	01-Dec-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-011	VA21C7234-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	136	100	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	261	201	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	10.6	7.05	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	5.22	4.47	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	52.2	41.9	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	3970	3360	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	3.0	3.4	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.12	9.28	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.84	2.84	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.20	6.21	---	---	---	
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	1.85	2.20	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.142	0.156	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1890	2000	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.19	1.38	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.758	0.813	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	139	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.56	0.53	---	---	---	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	---	---	---	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	---	---	---	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2149-A-11	BA2149-A-12	----	----	----
					Client sampling date / time	01-Dec-2021 09:00	01-Dec-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C7234-011	VA21C7234-012	-----	-----	-----	
					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	27.5	30.6	----	----	----	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA21C7234	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	: 07-Dec-2021 12:30
PO	: VANCO 0000050390	Issue Date	: 22-Dec-2021 12:20
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								
Speciated Metals	VA21C7234-001	BA2149-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.44 % ^{DUP-H}	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

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 BA2149-A-1	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-10	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-11	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-12	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-2	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-3	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-4	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-5	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-6	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-7	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-8	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2149-A-9	E510	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	28 days	11 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2149-A-1	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2149-A-10	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2149-A-11	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2149-A-12	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-2	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-3	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-4	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-5	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-6	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-7	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-8	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2149-A-9	E440	01-Dec-2021	11-Dec-2021	----	----		13-Dec-2021	180 days	12 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2149-A-1	E144	01-Dec-2021	----	----	----		10-Dec-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 BA2149-A-10	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-11	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-12	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-2	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-3	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-4	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-5	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-6	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-7	E144	01-Dec-2021	----	----	----		10-Dec-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 BA2149-A-8	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2149-A-9	E144	01-Dec-2021	----	----	----		10-Dec-2021	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-1	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-10	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-11	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-12	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-2	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-3	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2149-A-4	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2149-A-5	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2149-A-6	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2149-A-7	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2149-A-8	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2149-A-9	E108	01-Dec-2021	11-Dec-2021	----	----		12-Dec-2021	30 days	11 days	✔	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC											
Glass soil jar/Teflon lined cap BA2149-A-1	E532	01-Dec-2021	09-Dec-2021	30 days	8 days	✔	13-Dec-2021	7 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2149-A-1	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2149-A-10	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2149-A-11	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-12	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-2	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-3	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-4	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-5	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-6	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-7	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-8	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2149-A-9	E512	13-Dec-2021	----	----	----		14-Dec-2021	----	13 days	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-1	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-10	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-11	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-12	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-2	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-3	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-4	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-5	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-6	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-7	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-8	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2149-A-9	E444	13-Dec-2021	----	----	----		14-Dec-2021	180 days	13 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-1	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-10	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-11	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-12	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-2	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-3	EPP444	01-Dec-2021	13-Dec-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) BA2149-A-4	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-5	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-6	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-7	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-8	EPP444	01-Dec-2021	13-Dec-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2149-A-9	EPP444	01-Dec-2021	13-Dec-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)							
Hexavalent Chromium (Cr VI) by IC	E532	364171	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	364279	1	13	7.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	364280	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	364282	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	364281	1	13	7.6	5.0	✔
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	364171	2	1	200.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	364279	2	13	15.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	364280	2	13	15.3	10.0	✔
Moisture Content by Gravimetry	E144	364282	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	364281	1	13	7.6	5.0	✔
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	364171	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	367555	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	364279	1	13	7.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	367556	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	364280	1	13	7.6	5.0	✔
Moisture Content by Gravimetry	E144	364282	1	13	7.6	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	367555	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	367556	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 $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) 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 CVAAS ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
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 $<60^\circ\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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 : VA21C7234

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 : 07-Dec-2021 12:30
Date Analysis Commenced : 09-Dec-2021
Issue Date : 22-Dec-2021 12:20

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, Jon Fisher, Kevin Duarte, Ophelia Chiu, and Woochan Song.

Page : 2 of 11
Work Order : VA21C7234
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: 364281)											
VA21C7154-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	11.7	11.8	0.3%	5%	----
Physical Tests (QC Lot: 364282)											
VA21C7154-001	Anonymous	moisture	----	E144	0.25	%	32.2	32.3	0.336%	20%	----
Metals (QC Lot: 364279)											
VA21C7154-001	Anonymous	mercury	7439-97-6	E510	0.248	mg/kg	14.8	13.4	10.6%	40%	----
Metals (QC Lot: 364280)											
VA21C7154-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	12300	11800	4.02%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	548	601	9.15%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	74.7	77.4	3.58%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	439	401	9.00%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.51	0.58	0.06	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	45.9	51.9	12.4%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	122	117	3.62%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	156	148	5.17%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	284000	294000	3.59%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	138	162	15.8%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	12.5	12.8	1.90%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	609	641	5.12%	30%	----
		iron	7439-89-6	E440	50	mg/kg	5860	5820	0.808%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	1210	1360	11.8%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	17.1	18.0	5.08%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	7890	8010	1.48%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	252	261	3.56%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	31.2	41.6	28.6%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	58.0	64.8	11.0%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	35500	41600	15.9%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	23700	23300	1.47%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	3.01	3.29	9.05%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	12.8	13.8	7.79%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	31300	30000	4.03%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	479	494	3.11%	40%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Metals (QC Lot: 364280) - continued											
VA21C7154-001	Anonymous	sulfur	7704-34-9	E440	1000	mg/kg	14200	18500	26.1%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.412	0.407	1.18%	30%	----
		tin	7440-31-5	E440	2.0	mg/kg	434	462	6.42%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	83.1	117	34.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	7.92	8.99	12.6%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	31.8	38.2	18.1%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	156	185	17.0%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	11100	11600	5.11%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.9	0.2	Diff <2x LOR	----
Speciated Metals (QC Lot: 364171)											
VA21C7234-001	BA2149-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.17	mg/kg	0.65	# <0.20	0.44	Diff <2x LOR	DUP-H

Qualifiers

<i>Qualifier</i>	<i>Description</i>
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: 364282)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 364279)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 364280)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 364280) - 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	----
Speciated Metals (QCLot: 364171)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 367555)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 367556)						
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: 364281)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 364282)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 364279)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	92.0	80.0	120	----
Metals (QCLot: 364280)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.6	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	113	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	94.6	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.7	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.7	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.6	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.9	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.9	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.9	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.5	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	93.3	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.4	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.9	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	99.8	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	112	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	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	86.2	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	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: 364280) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.8	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.9	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.2	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	93.0	80.0	120	----
Speciated Metals (QCLot: 364171)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	91.6	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 367555)										
VA21C7234-001	BA2149-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.5	50.0	140	----
TCLP Metals (QCLot: 367556)										
VA21C7234-001	BA2149-A-1	antimony, TCLP	7440-36-0	E444	5.9 mg/L	5 mg/L	118	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.6 mg/L	12.5 mg/L	117	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.263 mg/L	0.25 mg/L	105	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.48 mg/L	10 mg/L	84.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.243 mg/L	0.25 mg/L	97.3	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.25 mg/L	1.25 mg/L	100	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	2.28 mg/L	2.5 mg/L	91.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	246 mg/L	250 mg/L	98.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	11.5 mg/L	10 mg/L	115	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	256 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.36 mg/L	2.5 mg/L	94.2	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.25 mg/L	5 mg/L	105	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.110 mg/L	0.1 mg/L	110	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.5 mg/L	5 mg/L	110	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.63 mg/L	5 mg/L	113	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	101	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: 364279)									
QC-364279-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	86.0	70.0	130	----
Metals (QCLot: 364280)									
QC-364280-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	108	70.0	130	----
QC-364280-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
QC-364280-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
QC-364280-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	98.7	70.0	130	----
QC-364280-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
QC-364280-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
QC-364280-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	94.5	70.0	130	----
QC-364280-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	103	70.0	130	----
QC-364280-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	----
QC-364280-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	98.2	70.0	130	----
QC-364280-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	96.1	70.0	130	----
QC-364280-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	100	70.0	130	----
QC-364280-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-364280-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	96.1	70.0	130	----
QC-364280-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-364280-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	99.9	70.0	130	----
QC-364280-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	98.1	70.0	130	----
QC-364280-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	100	70.0	130	----
QC-364280-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	98.8	70.0	130	----
QC-364280-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	107	70.0	130	----
QC-364280-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	95.4	70.0	130	----
QC-364280-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
QC-364280-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	92.6	40.0	160	----
QC-364280-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.8	70.0	130	----
QC-364280-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----
QC-364280-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-364280-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	103	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: 364280) - continued									
QC-364280-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	99.9	70.0	130	----
QC-364280-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	82.1	70.0	130	----
Speciated Metals (QCLot: 364171)									
QC-364171-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	203 mg/kg	75.0	70.0	130	----



Chain of Custody / Analytical Request Form
 Canada Toll Free: 1 800 668 9878
 www.alsglobal.com

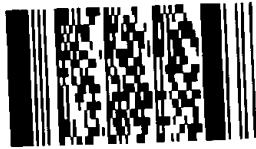
COC # _____

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				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT							
Address: 5150 Riverbend Drive				Email 1: smckinney@covanta.com				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT							
Burnaby BC				Email 2: rjohnson4@covanta.com				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT							
Phone: 604-521-1025				Email 3: dskrypnik@covanta.com				Analysis Request							
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No				brent.kirkpatrick@metrovancover.org											
				Sarah.Wellman@metrovancover.org											

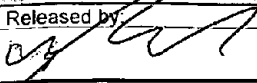

Invoice To Same as Report ?				Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)																																																			
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No				Job #:				<table border="1"> <tr> <td rowspan="5">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="5">MOISTURE</td> <td rowspan="5">Chrome 6</td> <td rowspan="5">MET-CSR+FULL-VA (all metals)</td> <td colspan="8">Number of Containers</td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>								MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																																							
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																																																							
Company:				PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																																							
Contact:				LSD: (includes 2:1 pH)																																																							
Address:				Quote #:																																																							

Lab/Work Order # (lab use only) 7234				ALS Contact:				Sampler:			
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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									
BA2149-A-1	Environmental Division Vancouver Work Order Reference VA21C7234  Telephone: +1 804 253 4188	01-Dec-21	9:00	Soil	X	X	X	X									1	
BA2149-A-2		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-3		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-4		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-5		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-6		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-7		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-8		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-9		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-10		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-11		01-Dec-21	9:00	Soil	X	X		X										1
BA2149-A-12		01-Dec-21	9:00	Soil	X	X		X										1

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

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

SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: 	Date (dd-mmm-yy): 7-Dec-21	Time (hh-mm): 0800	Received by:	Date:	Time:	Temperature: 20°/26°C	Verified by: 	Date: Dec 7/21	Time: 12:30	Observations: Yes / No ? If Yes add SIF	