

Bottom Ash Data

2022 Week 34

The following analytical report represents bottom ash composite results for week 34 of 2022 (August 21, 2022 to August 27, 2022).

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 : **VA22C0349**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Nicole Victor
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : ----
Project : Weekly Bottom Ash-Suite
PO : VANCO 0000051213
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 : 30-Aug-2022 12:00
Date Analysis Commenced : 02-Sep-2022
Issue Date : 09-Sep-2022 04:25

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>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2234-A-1	BA2234-A-2	BA2234-A-3	BA2234-A-4	BA2234-A-5
(Matrix: Soil/Solid)					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-001	VA22C0349-002	VA22C0349-003	VA22C0349-004	VA22C0349-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.5	16.1	16.4	16.9	16.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	9.84	9.72	9.82	9.99	9.80	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	33600	33200	36200	52700	42700	
antimony	7440-36-0	E440	0.10	mg/kg	115	102	117	84.9	102	
arsenic	7440-38-2	E440	0.10	mg/kg	41.8	33.5	36.8	25.9	26.7	
barium	7440-39-3	E440	0.50	mg/kg	431	438	477	524	527	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.40	0.40	0.42	0.42	
bismuth	7440-69-9	E440	0.20	mg/kg	10.2	7.26	8.58	11.2	7.93	
boron	7440-42-8	E440	5.0	mg/kg	192	198	197	245	209	
cadmium	7440-43-9	E440	0.020	mg/kg	13.4	54.3	13.8	9.60	23.1	
calcium	7440-70-2	E440	50	mg/kg	135000	141000	141000	130000	119000	
chromium	7440-47-3	E440	0.50	mg/kg	174	168	154	239	196	
cobalt	7440-48-4	E440	0.10	mg/kg	78.6	67.6	213	228	243	
copper	7440-50-8	E440	0.50	mg/kg	2710	1460	2620	2020	1440	
iron	7439-89-6	E440	50	mg/kg	54400	45300	54700	40300	59800	
lead	7439-92-1	E440	0.50	mg/kg	462	310	1420	294	558	
lithium	7439-93-2	E440	2.0	mg/kg	28.3	35.0	29.0	34.4	34.5	
magnesium	7439-95-4	E440	20	mg/kg	10800	11200	11800	10200	10000	
manganese	7439-96-5	E440	1.0	mg/kg	904	767	826	2320	1120	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0519	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	140	120	137	100	409	
nickel	7440-02-0	E440	0.50	mg/kg	164	161	217	116	121	
phosphorus	7723-14-0	E440	50	mg/kg	12600	13900	14600	12300	10500	
potassium	7440-09-7	E440	100	mg/kg	5290	5950	5760	5940	5100	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.38	0.41	0.30	0.31	
silver	7440-22-4	E440	0.10	mg/kg	4.11	7.63	6.09	5.70	4.28	
sodium	7440-23-5	E440	50	mg/kg	15000	16100	16600	17200	16400	
strontium	7440-24-6	E440	0.50	mg/kg	318	313	342	305	306	
sulfur	7704-34-9	E440	1000	mg/kg	12600	13300	13300	11400	10700	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2234-A-1	BA2234-A-2	BA2234-A-3	BA2234-A-4	BA2234-A-5
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-001	VA22C0349-002	VA22C0349-003	VA22C0349-004	VA22C0349-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.053	0.057	<0.050	0.052	
tin	7440-31-5	E440	2.0	mg/kg	125	112	112	164	106	
titanium	7440-32-6	E440	1.0	mg/kg	297	245	289	875	664	
tungsten	7440-33-7	E440	0.50	mg/kg	6.38	5.80	6.78	4.62	15.4	
uranium	7440-61-1	E440	0.050	mg/kg	5.90	5.76	6.06	5.05	4.60	
vanadium	7440-62-2	E440	0.20	mg/kg	53.8	51.0	53.8	47.7	46.8	
zinc	7440-66-6	E440	2.0	mg/kg	4720	3780	4120	3030	4130	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.6	2.3	3.6	2.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	10.9	11.0	11.0	11.0	11.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.19	8.18	8.35	8.13	8.14	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.62	6.29	6.44	6.45	6.60	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	2.34	2.69	2.64	2.75	2.80	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.231	0.202	0.269	0.174	0.125	
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2320	2240	2360	2390	
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	1.27	1.96	1.20	1.23	1.30	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.21	1.06	1.15	1.08	0.922	
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	119	126	125	130	126	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.50	0.44	0.51	0.46	0.36	
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	BA2234-A-1	BA2234-A-2	BA2234-A-3	BA2234-A-4	BA2234-A-5
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-001	VA22C0349-002	VA22C0349-003	VA22C0349-004	VA22C0349-005	
					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	32.3	40.5	21.8	20.9	17.3	17.3
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	BA2234-A-6	BA2234-A-7	BA2234-A-8	BA2234-A-9	BA2234-A-10
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-006	VA22C0349-007	VA22C0349-008	VA22C0349-009	VA22C0349-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	17.5	15.7	16.7	16.7	16.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	9.84	9.87	9.81	9.80	9.90	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	28900	43300	34900	32300	32200	
antimony	7440-36-0	E440	0.10	mg/kg	153	104	112	131	117	
arsenic	7440-38-2	E440	0.10	mg/kg	44.6	30.7	35.9	40.7	31.5	
barium	7440-39-3	E440	0.50	mg/kg	362	573	487	421	489	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.42	0.37	0.41	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	21.1	7.65	12.2	10.1	12.4	
boron	7440-42-8	E440	5.0	mg/kg	201	252	197	242	248	
cadmium	7440-43-9	E440	0.020	mg/kg	244	10.2	13.7	19.1	17.4	
calcium	7440-70-2	E440	50	mg/kg	156000	125000	132000	149000	134000	
chromium	7440-47-3	E440	0.50	mg/kg	199	220	164	190	145	
cobalt	7440-48-4	E440	0.10	mg/kg	108	334	232	136	125	
copper	7440-50-8	E440	0.50	mg/kg	4840	2120	2160	2280	3450	
iron	7439-89-6	E440	50	mg/kg	67600	67900	63200	63900	40100	
lead	7439-92-1	E440	0.50	mg/kg	568	399	504	451	632	
lithium	7439-93-2	E440	2.0	mg/kg	32.3	36.9	26.7	29.1	31.4	
magnesium	7439-95-4	E440	20	mg/kg	12500	11300	11000	11500	11700	
manganese	7439-96-5	E440	1.0	mg/kg	1140	1100	867	1060	768	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0601	<0.0500	0.0516	0.0759	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	184	114	113	157	152	
nickel	7440-02-0	E440	0.50	mg/kg	242	639	157	211	121	
phosphorus	7723-14-0	E440	50	mg/kg	15000	11200	12800	13700	14500	
potassium	7440-09-7	E440	100	mg/kg	6120	5590	5460	6160	5580	
selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.55	0.34	0.48	0.42	
silver	7440-22-4	E440	0.10	mg/kg	9.38	7.23	7.62	12.3	3.97	
sodium	7440-23-5	E440	50	mg/kg	17000	17100	15900	18700	15400	
strontium	7440-24-6	E440	0.50	mg/kg	378	308	312	352	299	
sulfur	7704-34-9	E440	1000	mg/kg	15800	10900	12600	14700	12100	
thallium	7440-28-0	E440	0.050	mg/kg	0.060	0.051	0.058	0.058	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2234-A-6	BA2234-A-7	BA2234-A-8	BA2234-A-9	BA2234-A-10
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-006	VA22C0349-007	VA22C0349-008	VA22C0349-009	VA22C0349-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	143	137	122	145	201	
titanium	7440-32-6	E440	1.0	mg/kg	376	661	398	358	333	
tungsten	7440-33-7	E440	0.50	mg/kg	11.8	17.6	8.31	7.17	6.15	
uranium	7440-61-1	E440	0.050	mg/kg	7.38	4.75	5.44	6.58	5.63	
vanadium	7440-62-2	E440	0.20	mg/kg	58.2	49.0	50.5	57.7	56.2	
zinc	7440-66-6	E440	2.0	mg/kg	5330	5380	6040	5330	4230	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.8	1.6	1.5	1.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.0	11.0	11.0	11.0	11.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.06	8.17	8.27	8.34	7.95	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.49	6.43	6.29	6.34	6.10	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	2.72	2.79	2.49	2.49	2.34	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.142	0.127	0.167	0.164	0.256	
calcium, TCLP	7440-70-2	E444	10	mg/L	2260	2280	2210	2220	2270	
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	1.28	1.64	1.25	1.51	1.29	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.04	1.07	1.25	1.16	1.32	
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	123	124	126	123	124	
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	0.44	0.46	0.52	0.56	
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	BA2234-A-6	BA2234-A-7	BA2234-A-8	BA2234-A-9	BA2234-A-10
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00	24-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-006	VA22C0349-007	VA22C0349-008	VA22C0349-009	VA22C0349-010	
					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	23.2	24.9	38.5	28.9	42.1	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2234-A-11	BA2234-A-12	----	----	----
Client sampling date / time					24-Aug-2022 09:00	24-Aug-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-011	VA22C0349-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	17.1	15.9	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	9.75	9.71	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	35800	57400	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	139	122	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	42.0	37.1	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	359	495	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.47	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	8.72	7.49	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	208	249	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	24.1	13.5	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	156000	142000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	198	144	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	87.6	69.8	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2770	2150	----	----	----	
iron	7439-89-6	E440	50	mg/kg	43800	36600	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	576	358	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	31.6	27.1	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12900	12200	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1110	920	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0940	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	177	132	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	178	157	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	15000	13200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	6360	6190	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.54	0.34	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.24	4.64	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17700	17700	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	559	327	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	15200	13900	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.061	<0.050	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2234-A-11	BA2234-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-011	VA22C0349-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	118	111	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	241	573	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	6.86	5.65	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	6.81	5.97	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	58.2	55.4	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4800	4160	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.6	2.9	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	10.9	11.0	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.44	8.42	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.07	6.26	----	----	----	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	----	----	----	
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	3.41	2.52	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.174	0.171	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2300	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.28	1.53	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.30	1.19	----	----	----	
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	126	133	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.80	0.63	----	----	----	
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	BA2234-A-11	BA2234-A-12	----	----	----
					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C0349-011	VA22C0349-012	-----	-----	-----	
					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	56.2	31.0	----	----	----	
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	: VA22C0349	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 30-Aug-2022 12:00
PO	: VANCO 0000051213	Issue Date	: 09-Sep-2022 04:25
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 Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	antimony	7440-36-0	E440	33.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	copper	7440-50-8	E440	49.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	molybdenum	7439-98-7	E440	54.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	nickel	7440-02-0	E440	45.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	sodium	7440-23-5	E440	66.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-1	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-10	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-11	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-12	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-2	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-3	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-4	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 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 BA2234-A-5	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-6	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-7	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-8	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2234-A-9	E510	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2234-A-1	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2234-A-10	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2234-A-11	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2234-A-12	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 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 BA2234-A-2	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-3	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-4	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-5	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-6	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-7	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-8	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2234-A-9	E440	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	180 days	15 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2234-A-1	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----		



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 BA2234-A-10	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-11	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-12	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-2	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-3	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-4	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-5	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-6	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2234-A-7	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----	



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 BA2234-A-8	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2234-A-9	E144	24-Aug-2022	----	----	----		06-Sep-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-1	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-10	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-11	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-12	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-2	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-3	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-4	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 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 BA2234-A-5	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-6	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-7	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-8	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2234-A-9	E108	24-Aug-2022	08-Sep-2022	----	----		08-Sep-2022	30 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-1	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-10	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-11	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-12	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-2	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-3	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-4	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-5	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-6	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-7	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-8	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2234-A-9	E512	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	28 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-1	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	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) BA2234-A-10	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-11	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-12	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-2	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-3	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-4	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-5	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-6	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-7	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	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) BA2234-A-8	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2234-A-9	E444	02-Sep-2022	04-Sep-2022	----	----		04-Sep-2022	180 days	11 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-1	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-10	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-11	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-12	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-2	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-3	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-4	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----		



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-5	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-6	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-7	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-8	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2234-A-9	EPP444	24-Aug-2022	02-Sep-2022	----	----		----	----	----	

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	634737	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	634736	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	634739	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	634738	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	634737	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	634736	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	634739	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	634738	1	20	5.0	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	632484	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	634737	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	632486	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	634736	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	634739	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	632484	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	632486	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. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. 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 $<60^{\circ}\text{C}$) 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 : VA22C0349
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 : VA22C0349
Client : Covanta Burnaby Renewable Energy, ULC
Contact : Nicole Victor
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : ----
Project : Weekly Bottom Ash-Suite
PO : VANCO 0000051213
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, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 30-Aug-2022 12:00
Date Analysis Commenced : 02-Sep-2022
Issue Date : 09-Sep-2022 04:25

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 Percent Difference (RPD) and Data Quality Objectives
Matrix Spike (MS) Report; Recovery and Data Quality Objectives
Reference Material (RM) Report; Recovery and Data Quality Objectives
Method Blank (MB) Report; Recovery and Data Quality Objectives
Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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 Alex Thornton, Hamideh Moradi, Janice Leung, and Kim Jensen.

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Work Order : VA22C0349
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 Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



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: 634738)											
VA22C0277-137	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.67	8.74	0.8%	5%	----
Physical Tests (QC Lot: 634739)											
VA22C0277-137	Anonymous	moisture	----	E144	0.25	%	13.3	13.1	1.86%	20%	----
Metals (QC Lot: 634736)											
VA22C0277-137	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	19500	19300	0.917%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.98	0.70	33.5%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	9.19	9.24	0.452%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	78.1	68.2	13.6%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.49	0.58	0.08	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.292	0.336	14.1%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	20300	18900	6.90%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	22.9	18.8	20.0%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	13.8	13.7	0.951%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	97.9	59.4	49.0%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	42800	40500	5.52%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	5.18	4.98	4.08%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	19.0	18.4	3.02%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	16300	15100	7.51%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	839	1040	21.3%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.75	1.32	54.5%	40%	DUP-H
		nickel	7440-02-0	E440	0.50	mg/kg	25.5	16.1	45.4%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	1280	1200	6.45%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	820	720	12.6%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.23	0.15	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	0.16	0.12	0.04	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	234	466	66.3%	40%	DUP-H
		strontium	7440-24-6	E440	0.50	mg/kg	63.8	49.8	24.6%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	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: 634736) - continued											
VA22C0277-137	Anonymous	tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	433	400	7.80%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.228	0.231	0.003	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.20	mg/kg	104	105	1.20%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	84.2	90.9	7.73%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.6	2.9	0.3	Diff <2x LOR	----
Metals (QC Lot: 634737)											
VA22C0277-137	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0491	0.0481	2.12%	40%	----

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: 634739)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 634736)						
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: 634736) - 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: 634737)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 632484)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 632486)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
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: 634738)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.3	95.0	105	---
Physical Tests (QCLot: 634739)									
moisture	---	E144	0.25	%	50 %	99.8	90.0	110	---
Metals (QCLot: 634736)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	99.8	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	100	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.9	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.5	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.8	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	95.3	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	107	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	108	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	113	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	104	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	97.4	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.3	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: 634736) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.1	80.0	120	----
Metals (QCLot: 634737)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	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 $\geq 1 \times$ 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: 632484)										
VA22C0349-001	BA2234-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
TCLP Metals (QCLot: 632486)										
VA22C0349-001	BA2234-A-1	antimony, TCLP	7440-36-0	E444	5.54 mg/L	5 mg/L	111	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		barium, TCLP	7440-39-3	E444	8.1 mg/L	12.5 mg/L	64.7	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.244 mg/L	0.25 mg/L	97.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.96 mg/L	10 mg/L	99.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.255 mg/L	0.25 mg/L	102	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	1.24 mg/L	1.25 mg/L	99.4	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	2.45 mg/L	2.5 mg/L	98.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	240 mg/L	250 mg/L	96.2	50.0	140	----
		lead, TCLP	7439-92-1	E444	7.82 mg/L	10 mg/L	78.2	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	278 mg/L	250 mg/L	111	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.43 mg/L	2.5 mg/L	97.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.95 mg/L	5 mg/L	99.0	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.103 mg/L	0.1 mg/L	103	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	93.7	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.88 mg/L	5 mg/L	97.6	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	89.6	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:

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: 634736)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	112	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	114	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	109	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	109	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	124	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	107	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	116	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	100	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	104	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	101	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	94.4	70.0	130	----

Page : 11 of 11
 Work Order : VA22C0349
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash-Suite



Sub-Matrix:

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: 634737)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	109	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC #

Page ___ of ___

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)		
Contact:	Steve Mckinney / Dan Skrypnyk	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
		Email 3:	dskrypnyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
			brent.kirkpatrick@metrovancover.org		Analysis Request	
			Sarah.Wellman@metrovancover.org			

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

Lab Work Order # (lab use only)	0349	ALS Contact:		Sampler:	
------------------------------------	------	--------------	--	----------	--

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis Request				Number of Containers
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	
BA2234-A-1		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-2		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-3		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-4		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-5		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-6		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-7		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-8		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-9		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-10		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-11		24-Aug-22	9:00	Soil	X	X		X	1
BA2234-A-12		24-Aug-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22C0349



Telephone : +1 804 253 4188

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
[Signature]	30-Aug-22	0800				20,20 °C	[Signature]	Aug. 30/22	12pm	